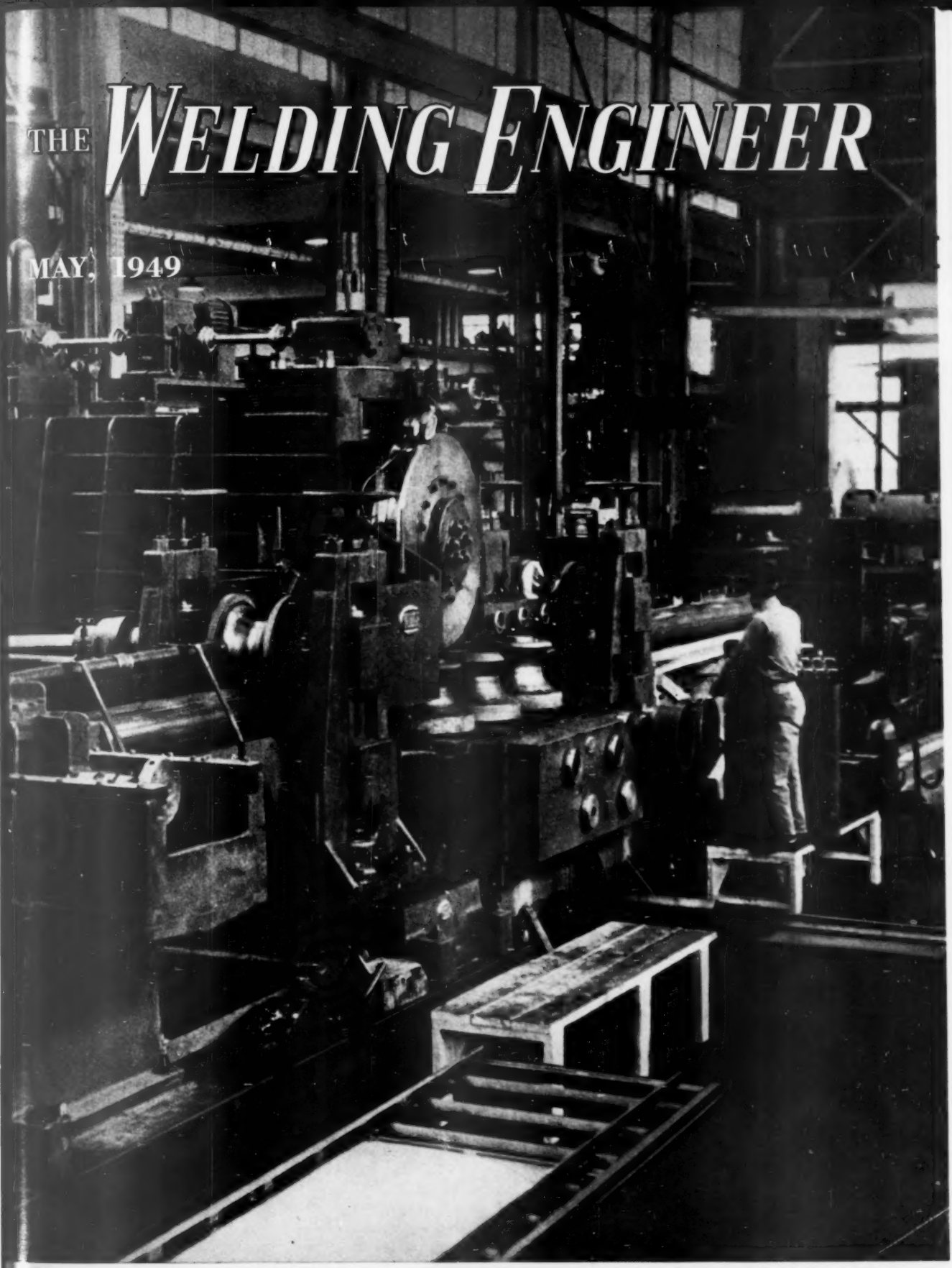
THE WELDING ENGINEER

MAY, 1949



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THE WELDING ENGINEER

THE WELDING ENGINEER, *with which is combined The Acetylene Journal*

A McGRAW-HILL PUBLICATION

Volume 34 - Number 5 May, 1949

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MORNING, NOON *and* NIGHT *for Five Years!*

Side view showing compactness of new MULTI-STAGE Regulator

Approved by *The Underwriters*

MULTI COPYRIGHTED STAGE

GAS PRESSURE REGULATOR

Defies abuse

To learn how much abuse a MULTI-STAGE would stand before the seat would require replacing, the adjusting screw of one of these regulators was turned in to 50 lbs., the maximum pressure for welding, the cylinder valve closed, the gas drained out of the regulator without disturbing the adjusting screw, then the full tank pressure of 2200 lbs. per sq. in. was suddenly turned on. This was repeated over 5000 times without disturbing the function of the regulator. Figuring between 250 and 300 working days in the year, this test is the equivalent of five years of constant abuse three times a day,—but what is *abuse* for the ordinary regulator does not impair the fine working qualities of the MULTI-STAGE.

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

INSIDE TANK, this worker is using the reflectoscope "angle-searching" unit in order to test a welded seam by reflected pulses of ultrasonic vibrations

Ultrasonic Weld Inspection

Recent improvements adapt the "reflectoscope" to weld inspection. Ultrasonic vibrations are projected through the plate at an angle by successive reflections and returned when a defect is encountered

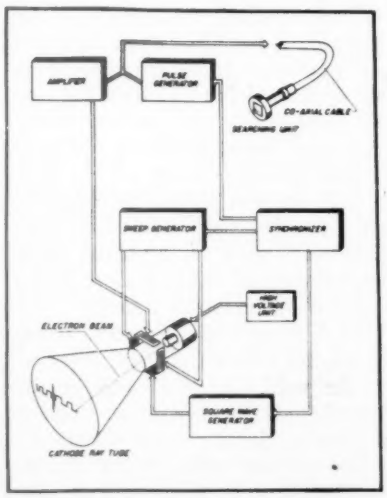
BY JOHN C. SMACK
Sales Engineer, Sperry Products, Inc.
Danbury, Conn.

SINCE the first announcement of commercial ultrasonic testing instruments more than four years ago, welding engineers have been keenly interested in the possible application of ultrasonic testing to weld inspection. Early tests with the "reflectoscope" indicated that the inspection of most commercial welds by the direct reflection of ultrasonic waves was not practicable. Subsequent developments, however, have provided an ultrasonic weld-testing technique which we believe to be cheaper and faster than other nondestructive testing methods.

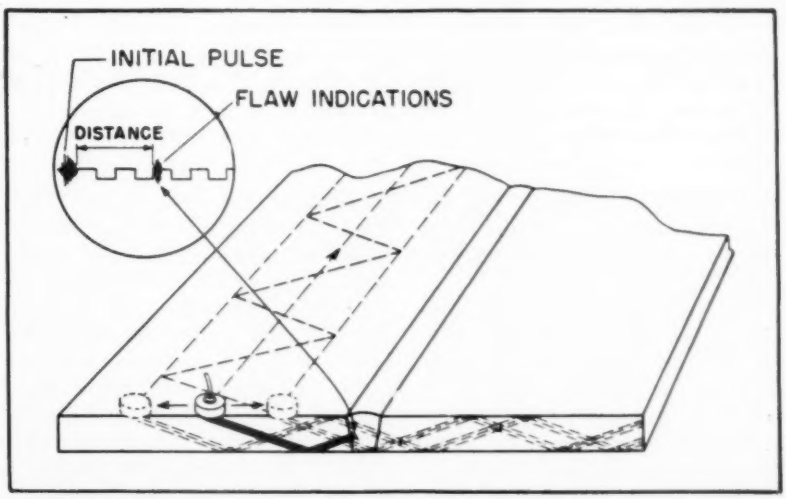
The angle-searching unit developed in 1947 provides a means for: (1) directing ultrasonic waves into welding materials from either side of the weld and (2) detecting discontinuities by reflection. Many field applications have shown this device to give reliable indications of discontinuities in commercial welds at considerable savings in time over other testing methods.

How Reflectoscope Works

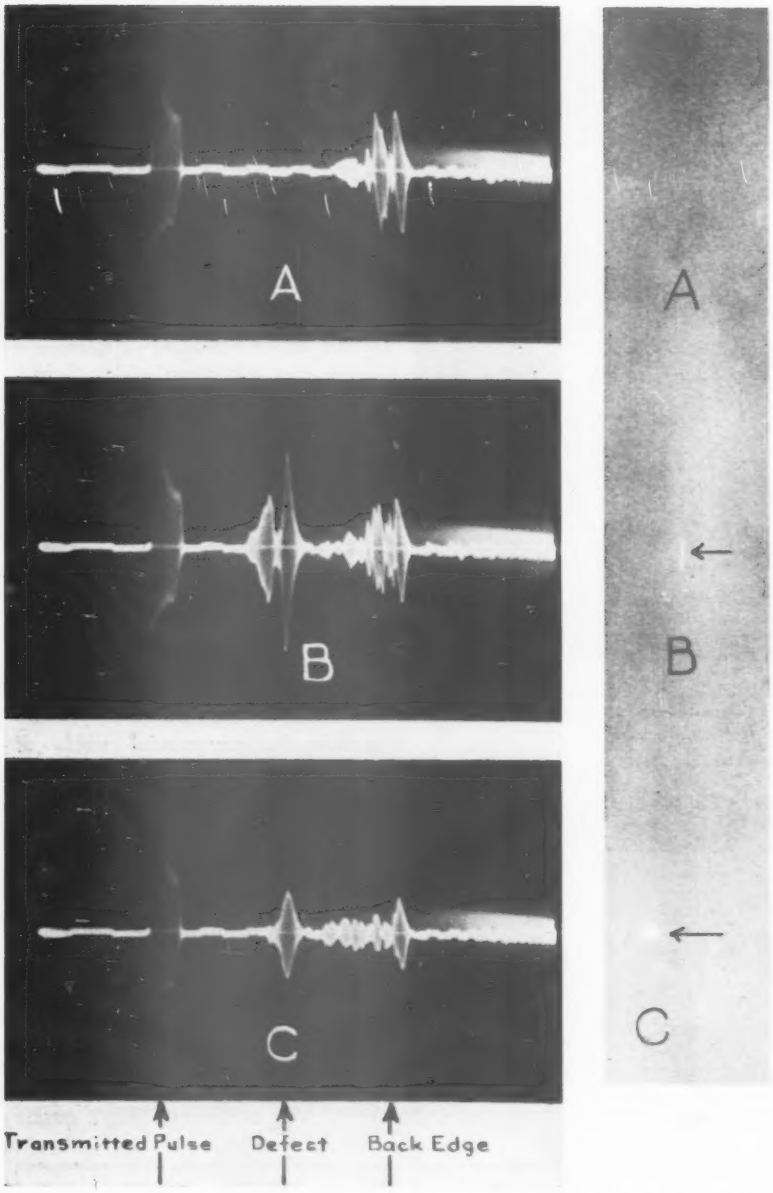
The reflectoscope (Fig. 1) consists of an electronic pulse generator, amplifier, sweep generator and other electrical circuits which produce a train of electrical pulses in any of four testing frequencies: ½, 1, 2¼ and 5 megacycles (one megacycle equals 1,000,000 cycles per second). A searching unit containing a quartz



1—REFLECTOSCOPE circuit diagram showing necessary components



2—PATH OF VIBRATIONS in angle testing method. Searching unit is oscillated back and forth while it is being moved forward parallel to the weld



3—REFLECTOGRAMS at 2¼ megacycles of welded curved steel plate ¼ in. thick. (A) good area in weld—no indication; (B) crack about ¼ in. wide by ⅛ in. deep; (C) drilled hole of ⅛ in. diameter, ⅛ in. deep. Radiograph of corresponding sections appears at right in order to provide comparison

crystal converts these electrical pulses to sound vibrations and transmits the vibrations into the material under test.

The usual method of testing is to project a beam of vibrations into the material under test at right angles to the surface. When these vibrations are intercepted by a defect or reach the other side of the piece, they are reflected back to the searching unit. When the reflected vibrations reach the crystal, a small voltage is generated by the crystal and is amplified in the reflectoscope. The screen of a cathode-ray tube gives visual indications of the start of the pulse, the duration of the pulse and the reflected vibrations. The indications on the screen are superimposed on a time line calibrated directly in units of distance in the material. The position of a defect indication in relation to the starting pulse locates accurately the distance of the defect from the searching unit. Because of the beam effect of ultrasonic vibrations, it is possible to locate accurately defects in a vertical plane as well as in a horizontal plane.

Most welds cannot be scanned for interior defects by this technique since the contour of the bead makes it impossible to seat the searching unit properly.

Beam Projection at Angle

In the angle-searching unit developed for weld testing, the quartz crystal is so arranged that when it is placed on the surface of a curved or flat plate it projects a beam of vibrations into the material at an angle. The angle is such that the vibrations are reflected off the other face and projected through the plate away from the searching unit by successive reflections between the surfaces of the material (as shown in Fig. 2) until either the edge or a discontinuity is reached. The reflected vibrations then return to the searching unit by a similar path.

The pattern on the screen indicates the distance and direction of the defect from the searching unit and the relative size of the reflecting area. The reflectoscope is sufficiently sensitive to locate extremely small discontinuities, smaller than can generally be located with X-ray or gamma-ray inspection.

Uniform Beads Required

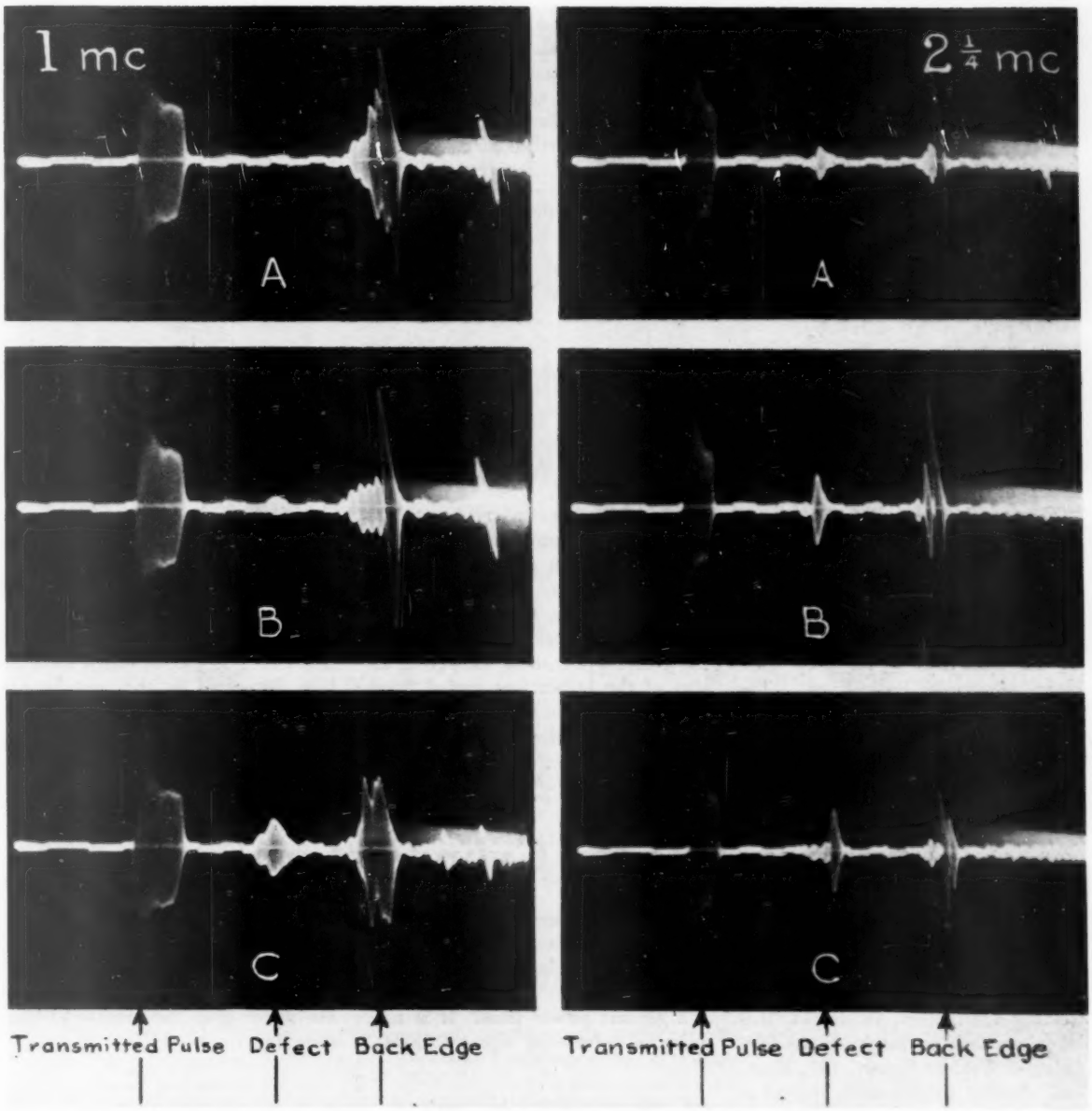
At the present stage of development, ultrasonic weld testing requires the following conditions for rapid testing and interpretation.

1. A relatively uniform bead or no bead. A rounded bead from manual welding or a square bead from automatic welding can be tested satisfactorily, but very uneven beads may cause reflections which will slow up interpretation.

2. A uniform surface on the plate on one side of the weld for a distance of 5 or 6 in. from the weld. Rolled surfaces without loose scale, rust or dirt are satisfactory.

3. A fairly uniform grain structure in the parent metal and adjacent to the weld. A very coarse grain growth near the weld may prevent passage of the ultrasonic vibrations.

The angle-searching unit is placed approximately 4 to 6 in. from the weld, and oil or glycerine is applied to the material to provide intimate



4—GREATER SENSITIVITY is evidenced by right reflectograms at 2¼ megacycles of welded 1-in. flat plate than by left series at 1 mc. (A) good area—minute defect indicated at 2¼ mc.; (B) slag inclusion; (C) open weld root

contact. Pointing toward the weld, the searching unit is oscillated back and forth in a short arc and at the same time moved along a path parallel to the weld. The area traversed is approximately twice as wide as the thickness of the plate. If an indication appears on the screen, the position of the discontinuity can be determined by noting: (*a*) the direction in which the searching unit is pointed and (*b*) the distance from the searching unit as indicated on the calibrated time line. The approximate size of the reflecting area can be determined by comparing the height of the indication with indications from a standard test sample. The approximate depth below the surface of a defect can be determined in materials of about one inch and thicker.

Radiographs and Reflectograms

Comparisons of ultrasonic weld tests with radiographs serve to emphasize the basic differences of the two methods. Radiographs are usually referred to as shadow pictures and must be interpreted accordingly. The angle at which the rays penetrate the material and film is an important consideration. Exposures at different angles are frequently required to assure complete inspection and correct interpretation.

The behavior of ultrasonic vibrations can be compared with that of light as the high-frequency vibrations are reflected from internal discontinuities and from edges or sides of materials as though they were mirror surfaces.

These two methods of inspection cannot be compared directly as the orientation of a discontinuity will, in many cases, result in different in-

dications in a radiograph and in a reflectogram. Also, the standard of sensitivity selected for a given reflectoscope test may purposely pass over minor defects. In any comparison, the standards of sensitivity for ultrasonic testing and radiography must be stated. Ultrasonic sensitivity is determined by frequency, crystal size and gain level as set on a standard test block.

The accompanying radiograph and reflectograms made in comparative tests of welds show general agreement but variance in some details of extent of defects.

Fig. 3 compares an X-radiograph of a sample of welded curved steel plate ¼ in. thick with reflectograms made at locations "A," "B," and "C" at a frequency of 2¼ megacycles. Searching unit was placed about 4 in. from the center of the weld. In the good area at "A," the reflectoscope gave no indication of a defect. At "B," a small crack about ¼ in. wide by ⅛ in. deep gave clear ultrasonic indications. The ⅛ by ⅛ in. hole drilled at "C" gave a relatively smaller indication on the reflectoscope than the crack. The ultrasonic indications from the hole were smaller because only a relatively small amount of ultrasonic vibration is reflected back from the curved surface of the drilled hole.

Frequency and Sensitivity

Comparison of 1 and 2¼ megacycle frequencies is given by the reflectograms of Fig. 4, made in 1-in. welded flat steel plate. The reflectogram made at "A" at 2¼ mc shows a minute discontinuity. The slag inclusion at "B" gave a barely noticeable indication on the reflectoscope at 1 mc but a positive indication at 2¼ mc.

The reflectograms made at "C" shows typical response by the reflectoscope to an open weld root at both frequencies. In the ultrasonic test of this area, there were similar indications at both frequencies along the entire open root. However, the size of the indications varied much more at the 1 mc frequency than at 2¼ mc, thus indicating that the discontinuity at the root varied in cross section.

From the reflectograms herewith reproduced, it is apparent that the minimum detectable defect varies with frequency, greatest sensitivity being at the highest frequency. This variation permits a standard of sensitivity to be established for each application at the desired level.

Both Methods Needed

Present experience with ultrasonic inspection of welds indicates that there is an immediate need for this method to supplement though not supplant radiographic inspection. Both methods of inspection are needed to locate all of the discontinuities which can be classified as harmful defects. The particular advantages of ultrasonic inspection are that it is fast, relatively inexpensive and can be applied immediately to many welded structures not classified under any code which have not been inspected in the past because of the high cost and time required for inspection.

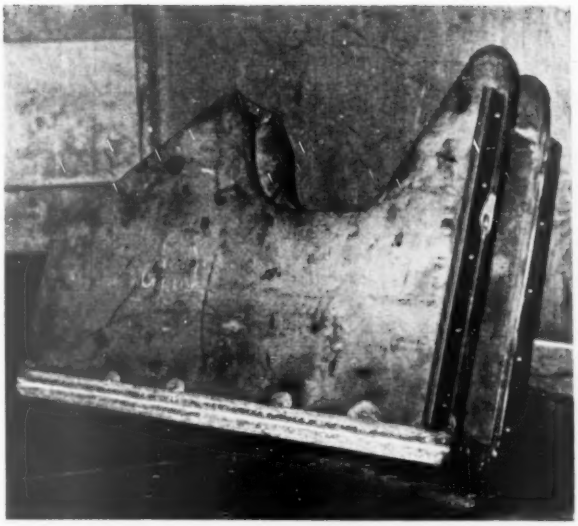
Sunken Pits for Cylinder Loading

LOADING of heavy oxygen and acetylene onto trucks requires a great deal of muscular effort and is a time-consuming operation at most welding distributors. To simplify this laborious task as much as possible, Calumet Welders Supply, Inc., Gary, Ind., devised a clever arrangement of sunken pits and a loading dock at the back of its new building.

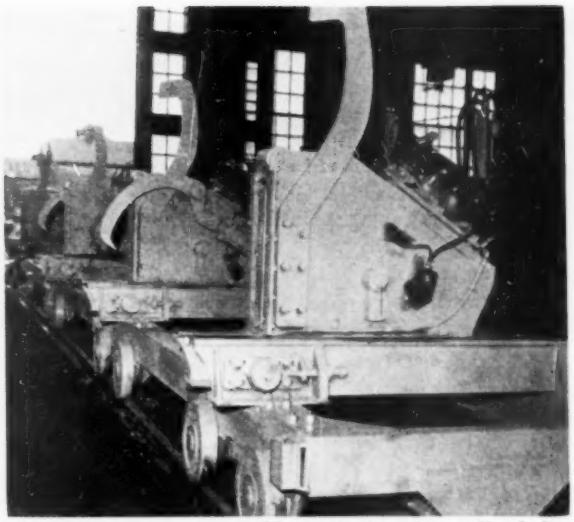
There is space for two trucks, one on either side, which are backed down ramps at the rear of the building. When a truck is inside the building, its bed is level with the floor of the loading platform, which is shaped like the letter "T." The stem of the "T" projects between the two trucks and its cross piece extends across the rear. Hence it is easy to load a truck from either the side or the back merely by rolling the cylinders into place.

In addition to oxygen and acetylene, Calumet Welders Supply handles a-c and d-c arc welders, electrode holders, welding cable, welding and cutting torches, pressure regulators, hose, welding fittings, all principal types of electrodes and welding rods, fluxes, welding and ground clamps, wire brushes, gloves, goggles, face shields, helmets, fire extinguishers and electric power tools. It is now doing a volume of about $250,000 annually in these products. Territory extends about 80 miles south of Gary and includes the six northwestern Indiana counties fronting along Lake Michigan and the Indiana-Illinois state line.

LOADING DOCK for oxygen and acetylene cylinders. The trucks back down the ramps to sunken pits until truck beds are level with the dock floor



1—AS-WELDED carriage knee. Aluminum-bronze overlay increases many times the life of bearing surface



Photos courtesy Ampco Metal, Inc.

2—FINISHED CARRIAGE with four knees is waiting shipment to a lumber mill of the Pacific northwest

New Life for Lumber Carriage Knees

BY WILBUR C. SMITH
Industrial Specialties Co., Portland, Ore.

Binding and galling on the ways of portable saw carriage knees was resulting in field repairs and lost operating time. The bearing surfaces are now overlaid with aluminum bronze during manufacture

Logs of 4 to 6 ft diameter measuring up to 40 ft in length are by no means uncommon in lumber mills of the Pacific northwest. Such giants of the forest are sawed on portable saw carriage knees fabricated by the Monarch Forge & Machine Works, Portland, Ore. Service is tough because of the high pressures and very heavy loads developed in sawing. Especially, difficulty was encountered at the point of maximum overhang where the steel way would become worn and sloppy. Excessive wear on the ways caused mating surfaces to bind and gall, resulting in lost operating time and expensive field repairs.

The manufacturer decided to do something about it.

Surfaces Overlaid

The portable saw carriage knees are now produced with long-lasting bearing surfaces, increasing their life expectancy by many times. The welded overlays can withstand the excessive loads encountered without scratching, galling and squashing out.

The ideal bearing surface, it was found, is one obtained by mating copper alloys to iron-base metals. An aluminum-bronze electrode of ASTM-AWS specification E CuA1-C was chosen to do the job.

This produces a structure containing hard, fine aluminum-iron particles evenly dispersed throughout the softer copper-aluminum-iron matrix. Tensile strength of the weld metal is given as 101,000 psi, Brinell hardness as 200 and elongation in 2 in. as 9%. Thus the deposit is characterized by high hardness and tensile properties coupled with good ductility.

The ways were undercut for a deposit that would have a minimum thickness of 1/4 in. after finish machining. Weld metal was then deposited by the metal-arc process, using d-c reverse polarity (electrode positive). The inside of the way was welded with 3/16-in. diameter electrodes and the outside areas with 1/4-in. electrodes. Preheating was unnecessary because the base metal was carbon steel.

The Finished Job

Fig. 1 shows an overlaid way immediately after welding. A dense deposit was obtained and an excellent machined finish that provides an almost perfect bearing surface. A carriage with four finished knee assemblies is pictured in Fig. 2 ready for shipment to a logging mill of the northwest forests. Needless to say, the addition of overlaid wearing parts has added a sizable amount of sales appeal to this industrial product. Many other manufacturers might profitably take a tip.

BY T. B. JEFFERSON

SALES COUNTER with its complete catalog (shown at left behind the welding helmet) is the heart of Jim Alcock's new store at Saginaw, Michigan

Visible

Everything clearly marked, every item carried on display—these are the sound principles that increased cash counter sales by 70% and charge pick-ups by 120% in the new store of Saginaw Welding Supply

In April, 1942, a young salesman and his wife decided to start a welding supply business of their own at Saginaw, Mich. The story of Jim and Rose Alcock has already been told in the pages of The Welding Engineer* but not the interesting sequel to it.

Outgrew Three Locations

During a seven-year period, constantly expanding business made it necessary for the Alcocks to shift their location three times. After each move the new quarters seemed adequate, but each time the capacity of the Saginaw Welding Supply Co. to draw in new business proved to have been underestimated. Little wonder, then, that the question today uppermost in the minds of both Rose and Jim is, "Will we also outgrow 426 South Washington?"

The South Washington address at Saginaw represents the Alcocks latest and most ambitious move. This time they are in their own building, one renovated and remodeled according to Jim's own specifications as to what constitutes the last word in the merchandising of welding supplies.

Those who know Jim Alcock personally or who have heard him talk before meetings of the National Welding Supply Association will not be surprised to learn of the vast amount of preliminary work expended to make the new store welding headquarters for the Saginaw valley. Unlike Topsy, the enterprise didn't "just grow"; it was planned that way. And the planning took years.

First thought toward their present expansion occurred several years ago when the Alcocks set out deliberately to find "a location for the future." Their specifications were rigid and uncompromising. First they must have a "good building on a main thoroughfare." It had to be close to downtown Saginaw and the industrial area yet provide ample parking facilities for customers. For many months it seemed as if these various requirements were mutually exclusive, so fruitless was the search. Finally, though, the 60 by 120 ft building at 426 South Washington came on the market. It was soundly built of cement blocks and faced brick and had last been occupied by a skating rink, which had installed a magnificent hardwood floor. As for the location, the Alcocks were sure that it would prove to be the perfect location for a modern wholesale and retail welding supply store. They bought the property late in 1944.

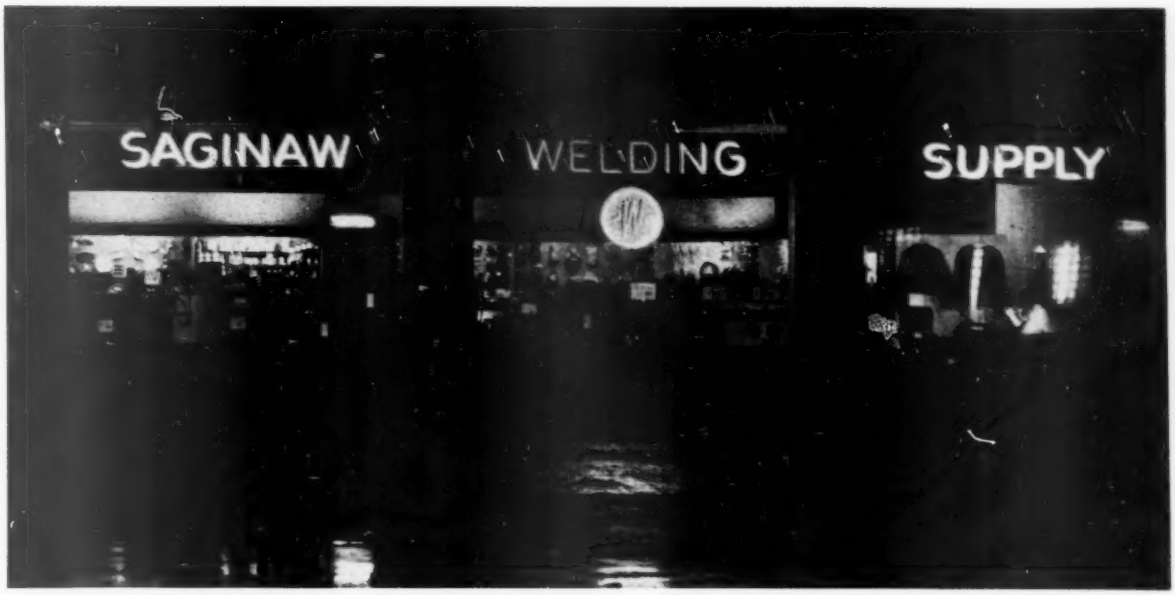
Seeks Advice from Experts

Instead of moving in haphazardly, catch-as-catch-can, the way some distributors might do, the Alcocks decided to undertake extensive remodeling that would turn the former skating rink into the ideal establishment for the merchandising of welding supplies. The word "ideal" is not loosely used; we mean precisely that. Alcock naturally had his own ideas —and plenty of them—as to what that ideal should be, but, as he figured it, more and perhaps even better ideas might be obtained from outside. Hence he devoted a rather large amount of time to calls upon leading merchants in general lines in Saginaw and the nearby cities of Flint and Detroit to learn the latest wrinkles in merchandising and display. Especially helpful were the display managers of Sears, Roebuck & Co., Montgomery Ward & Co., S. S. Kresge Co. and F. W. Woolworth Co. The local power company sent out its engineers to suggest lighting methods, and a local paint dealer contributed recommendations on color harmony.

All of this advice from the experts was carefully studied and digested by Alcock before the actual work of reconstruction began.

First step in the remodeling was to determine the various areas of operation in the building. The sales room was laid out to be 45 ft wide and 30 ft deep. Its three large dis-

*The Welding Engineer, May, 1947.



THREE LARGE SHOW WINDOWS are equipped with floodlights and fitted with rose-pink neon signs bearing name of Saginaw Welding Supply. Today there are 7,200 sq ft of floor space as compared to 800 sq ft occupied in 1942

Merchandising

play windows were to be equipped with floodlights in order to attract the attention of passing traffic. This attention-getting effort was done on the recommendations of the lighting consultant, who advised Alcock that 87½% of all impressions received come through the eye. The three windows were also fitted with rose-pink neon signs reading "Saginaw Welding Supply" and the center window carried the company's distinctive SWS trademark.

The 15 by 40 ft space to left of the sales area was partitioned off into a private office for Jim Alcock and a general office area. The remainder of the building was devoted to a general warehouse and storage.

The problem of correlating the many ideas so carefully gleaned now began. A display engineer from a local plant was called in as a consultant, and detailed drawings were made of the proposed store layout. These drawings were taken to a fixture builder, who also had some novel ideas of his own to contribute.

The sales counter, situated 30 ft in back of the display windows, provides the actual working area for at-the-store sales. Directly behind the sales counter is a colorful back bar. Painted an attractive green, this back bar is 8 ft high and divided into eight sections. Each section displays either a single line of merchandise or a group of associated items. The displays include gas-welding equipment, small tools, fluxes, face-protection equipment, protective clothing, electrode holders, arc-welding accessories and air controls. All of the merchandise on the back bar may be removed for inspection or immediate sale.

Below the eye-catching displays of the back bar are a number of glass-divided display bins built on a slope. These bins hold small items such as welding and cutting tips, wire brushes, lighters and flints, welding lenses, gloves, cable lugs and connectors, air couplings and adapters. Welding rods and electrodes are displayed under the bins and are also packed for counter sale.

Rod Displays

The welding rods are arranged for color contrast so that the customer may readily see and spot the particular type he is after. Copper-coated mild-steel electrodes are placed first in the rack, then come high-tensile, bright-finished rods, bronze welding rods, copper-coated welding rods, alloy rods, etc. Because of their length, the gas-welding rods are placed in a vertical position. The various types of gas rods are separated by steel display hangers of the kind used for holding tools. For counter sales, these rods are bundled into 5-lb packages; experience has shown that a customer who comes in for only a pound or two of "fender wire" will readily take a standard 5-lb package when he is shown one.

The electrodes are likewise bundled in 5-lb packages and displayed horizontally on display hangers. These displays are made up only of fast-moving electrodes, which are sold so quickly that there is no danger of coating deterioration because of the open display. Again, it is believed, the 5-lb package increases the amount sold to the walk-in customer. On each side of the electrode display are 20 by 20 in. floor stands for the displaying of standard 50-lb cartons of electrodes. A large stock of both gas-welding rods and electrodes is

EIGHT BACK BARS were built to display the related items. Welding rods are displayed beneath back bars

FIFTY-POUND packages of electrodes are on pallets (see picture at left); the 5-lb bundles are on hangers

Every item the store carries is plainly visible in eye-catching displays

stored in the rear of the building near a truck-level loading dock.

Prices in Plain Sight

Both the back bar and lower display cases are lighted indirectly by fluorescent lighting. This naturally draws customers' attention. The customer who wants to know the price of an article displayed doesn't have to ask, for every piece of merchandise in the store (whether it is on a hanger, shelf or in bin) carries its style number and price on a large easy-to-read tag. Larger items and group displays have show cards mounted in special frame holders, which carry a brief description of the important sales features of the product as well as its price. One example: the sign on a stack of standard 50-lb packages of electrodes gives the price per box, AWS classification number and information on the various sizes of the particular electrode in stock. The 5-lb packages of gas-welding electrodes show the price per pound and the total price of the package.

Besides counter and back bar displays, there are several "island counters" to feature special items. Welders are placed in various strategic spots on the sales floor. There are also feature displays made up of a few items which are changed every two weeks.

A study conducted by the Retail Grocers' Association shows that 32% of all grocery items are sold on what may best be described as "impulse" basis. If this is true of such a necessity as food, it should also prove true of welding supplies. Experience of Saginaw Welding Supply has shown that impulse buying is greatly stimulated by the feature displays in the center of the sales room. On these featured items, sales have increased tremendously. They have, in fact, averaged better than 32% of total sales because many unusual items are featured that do not have competition from competing displays.

Customer Sells Himself

Having merchandise in clearly priced standard packages has greatly increased the efficiency of the counter salesmen. Practically everything for sale may be reached with a few steps, and it isn't necessary to look up prices in a bulky catalog. Since everything is clearly marked, the customer immediately knows whether or not be can afford to buy an item, and there are never any arguments about price.

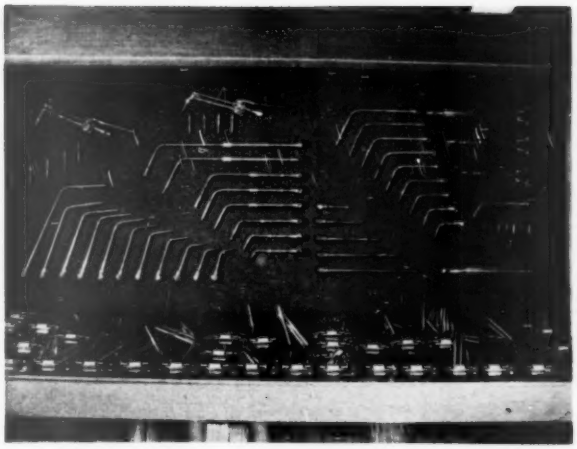
The amazing sales power of Alcock's visible merchandising plan is evidenced by a specific example. Recently, a farmer dropped in to buy 50 pounds of welding electrodes and have a regulator repaired. In all, he would probably have spent about $10, but while he was waiting for the repair job to be completed he walked around the store and viewed the merchandise. One thing led to another that he felt he needed. After a wait of about an hour, he had managed to pick out some $72 worth of merchandise. It isn't an isolated instance, either.

Before Saginaw Welding Supply moved into its downtown location, about 80% of its sales volume was made up from orders from large industrial plants. Welding shops and garages accounted for about 15%, and the remaining 5% was from cash sales over the counter. Over-the-counter business is now up by 70%, and charge pick-up sales have increased 120%. It's all directly due to the fact that the merchandise is visible and readily available.

Telephone Orders

Since such a large percentage of the total sales are with industrial plants, it is most important that a capable person be delegated to handle the company's telephone orders. Regardless of the activities of outside salesmen, a large portion of industrial customers will ask quotations and place their orders by telephone. A good operator in the order department must have a knowledge of the products, of the customer's requirements, of the stock on hand and be able to quote the correct prices. It's an important job.

To expedite the filling of orders, a good stock of merchandise is maintained. The stock bins are divided



COUNTER BINS below back bar displays are convenient for grouping small related items like torch tips

ISLAND COUNTERS are employed to display featured sales items. Note the large and descriptive price tag

into 14 sections, which are identical to sections in the company's catalog. The sectional divisions are:

1. Gas-welding equipment;
2. Gas-welding supplies;
3. Arc-welding equipment;
4. Arc-welding supplies;
5. Tools;
6. Grinding wheels;
7. Air equipment;
8. Hose;
9. Steel shop equipment;
10. Fencing;
11. Face protection;
12. Protective clothing;
13. Safety equipment;
14. Miscellaneous.

These various catalog sections are broken down into alphabetical order according to the name of the supplier. When any literature or a price is received from a manufacturer, an interoffice memo is sent to all employees who have anything to do with sales in order to advise them that the catalog sheet attached is to be filed under a certain section of the catalog. In this way each salesman's catalog is always kept up-to-date with the latest product and price information. An extra catalog is maintained to use in case a catalog is lost or if additional sales help is added.

Sales Territory

How large a territory to cover is one of the big problems of welding distributors. Alcock faced it squarely and decided that his sales area should be limited to within a 100-mile radius of Saginaw. The company's territory includes some 29 counties in the northeast half of the lower peninsula of Michigan. Many plants within this area can be quickly reached by sales engineers, and rapid delivery can be made by truck or bus.

A resident salesman lives in Flint. Besides covering Flint, he represents Saginaw Welding in Owosso, Lansing and in the southern portion of the thumb area of Michigan. Three other outside salesmen have similar areas which they can cover adequately. Major industrial areas are visited at least once a week, and every customer is contacted at least once a month, including customers in rural towns.

By reading the new products pages of The Welding Engineer and other trade journals, Alcock keeps abreast of new items. New items have news value and also sales value. Whenever a new item is chosen, it is given an immediate sales promotion. The product is featured in the sales room, and salesmen carry samples with them, if possible, to explain its features or to give demonstrations. Sales literature (which always carries the imprint of Saginaw Welding Supply) is left with prospective customers, and envelope stuffers concerning the new item are enclosed with bills and in packages sent out by the shipping department. This type of concentration insures that all customers will soon become familiar with the new product. Salesmen are likewise educated at regular Saturday morning sales meetings, at which time the new products are discussed and shown. Important: a new item is never added to the line until its sales potential has been surveyed.

Advertising Program

In merchandising welding equipment, Jim Alcock's policy is to merchandise Saginaw Welding Supply as well. Manufacturers' sales literature which leaves little or no space for the company's imprint is not popular. Manufacturers sales helps are backed up by local newspaper advertising to the tune of 3.2% of total sales and by novelties like scratch pads, matches, weldor caps, balloons, paper clamps, knives, etc. A 132-page catalog was recently issued and has proved to be a profitable full-time "silent salesman."

The salesmen carry sales route books which give the name and address of every customer and the key man to contact. Each route book is the property of Saginaw Welding Supply, and the fact is made clear that it has only been loaned to the salesman. In the event the regular salesman is unable to serve his territory, a temporary or a new salesman can readily orient himself. An alphabetical card index of all customers is also maintained in the office for reference purposes and to serve in making up mailing lists.

Saginaw Welding Supply strives to furnish the highest quality of merchandise in the field at reasonable prices. The manner in which sales have grown in the past seven years indicates that the company is fulfilling its objectives, as far as its customers are concerned.

CASTING DEFECT in skeg of freighter *Hawaiian Merchant* as it appeared after being chipped out. Defect extended to a depth of 7 in. over an area 17 by 20 in.

SLICE OF STEEL 2-in. wide was taken from the skeg to prepare it for thermit welding. After flame-cutting, the two sections were aligned with a gap as shown

Thermit Welding Repairs

One of the largest jobs of thermit welding ever to be handled on the Pacific coast was completed in 72 hours on a Matson freighter at the San Francisco yard of Bethlehem Steel shipbuilding division

BY MARGARET RALSTON

When the SS *Hawaiian Merchant*, a freighter of the Matson line, was placed in drydock at the San Francisco yard of Bethlehem Steel Company's shipbuilding division for routine painting and opening of sea valves, a startling discovery was made. There was a small crack in the forward end of the skeg—that part of the stern frame which connects the keel with the bottom of the rudderpost. The crack was found at the point where the radius of the aperture starts. As it was being chipped out, the further discovery was made that what had originally been taken for a small crack was in reality a large casting defect—a void of 7-in. depth extending irregularly over an area of 17 by 20 in.

When the full extent of the defect had been uncovered by chipping, the condition was reported to the American Bureau of Shipping. ABS recommended that a flame-cut slice 2-in. wide be taken from the skeg to enable the cavity to be filled by thermit welding. The only other satisfactory method of repair, the bureau declared, would be removal of the entire lower section of the stern frame.

The cuts were made as nearly vertical as possible, and the sections were thoroughly cleaned in order to expose uncontaminated metal on each side of the fracture. Loose oxide and scale left on the parts from cutting was carefully brushed away, and all dirt and grease were removed as far back as the mold box would reach.

Next the parts were aligned. An allowance for contraction was made by setting the two sections of the skeg sufficiently far apart to make up for the contraction of the thermit steel in cooling. The gap and the chipped-out cavity were filled with pattern wax, which occupied all of the space to be later filled with weld metal.

Building the Mold

A mold box with perforated sides and bottom was constructed and attached to the joint to be thermit welded. A wooden gate pattern for the preheating opening was set at the lowest point of the wax pattern, leading out to an opening in the front of the mold box. A second wooden pattern for the pouring gate was placed against it, and a third pattern for the riser was placed at the highest point of the wax pattern. It is the function of the riser to hold a supply of steel which will remain liquid for a longer time than the metal in the weld proper and so take care of "pipes" that may be formed because of shrinkage. The riser also acts as a depository for loose sand or other foreign matter washed into it by the thermit steel in passing through the mold. Hence the weld proper can contain only sound metal.

CRUCIBLE at bottom right contains molten steel created by the iron oxide-aluminum reaction. It is being poured into mold to fill up cavity and cut in skeg

COMPLETED WELD before grinding. About 1,500 lb of thermit were used to add the new metal, and the joint was allowed to cool in the mold box for about 12 hours

a Cracked Stern Frame

Molding material—a special mixture of silica sand and plastic clay—was rammed tightly about the wax pattern until it was hard and firm at every point where it came in contact with the wax. After the mold had been well rammed, a channel was cut in its top surface to connect the top of the pouring gate and the top of the riser. The mold was then thoroughly vented by forcing a rod made from steel wire down through the molding material in a number of locations. Purpose of these vents was to allow the escape through the mold of air trapped in the falling steel and any gases formed in the mold. Gate, riser and heating-opening patterns were rapped lightly in order to loosen them and were then withdrawn gently from their respective holes. The mold was ready for preheating.

Preheating and Pouring

Preheating was done with kerosene torches and carried on a sufficient length of time to melt out all of the wax. This left a perfect mold the exact shape of the original wax pattern for the molten steel to occupy.

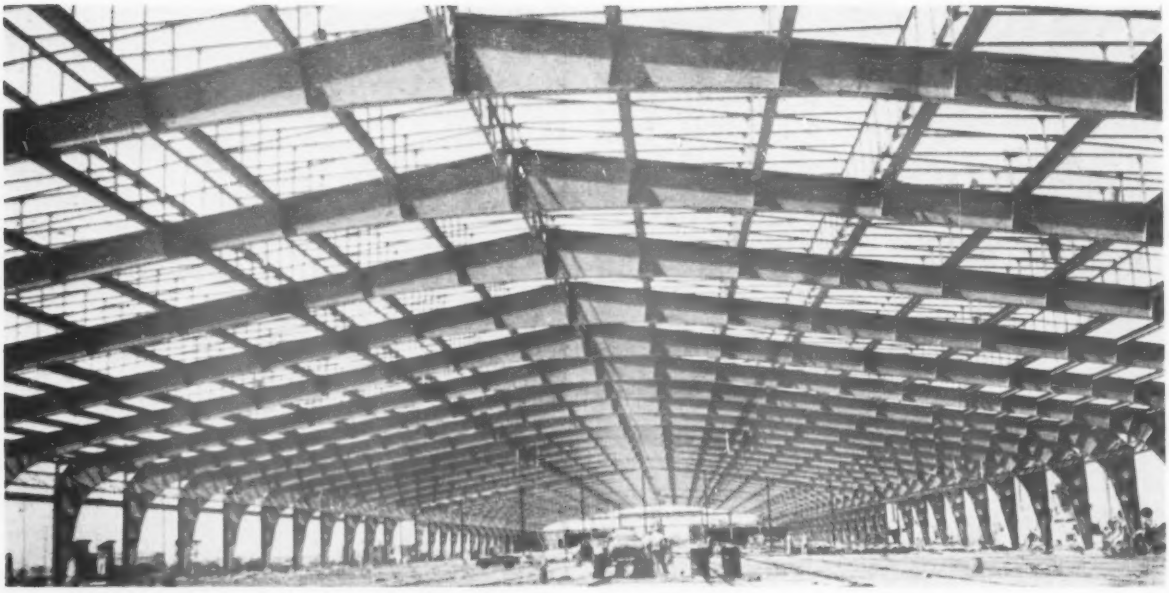
While preheating was in progress, a thermit crucible was dried out at a temperature slightly under 300 F in order to make sure that its magnesia tar lining would contain no moisture. A measured amount of thermit was placed in the crucible, which was then lifted so that its bottom was immediately above the entrant lip at the top of the pouring gate. A small amount of ignition powder was placed on top of the thermit and ignited. Within 25 to 35 seconds the reaction of aluminum and iron oxide had been completed. The tapping pin in the bottom of the crucible was then knocked up to permit the molten steel to flow through the pouring gate into the hollow formerly occupied by the wax pattern. The joint was allowed to cool for about 12 hours before the mold box was removed.

Done in a Week End

The timetable on this job showed that the necessary authorization to thermit weld was received at 9 a. m. on a Friday. Shoring, aligning, forming of wax pattern and building of the sand box were completed by 8 p. m. Saturday. Preheating was started at this hour of Saturday night and continued until 8:55 a. m. Sunday, at which time the thermit weld was made.

The welded frame was allowed to cool until 9 p. m. Sunday, when the box was removed. Gates and risers were cut away. The weld was ground and dressed; the adjoining areas restored to their original condition. The vessel's rudder was tested on Monday morning at 8 and approved by the regulatory bodies concerned as being properly aligned. The ship was floated at 10 a. m.

About 1,500 lb of thermit were used in making this big weld. Two Metal and Thermit Corp. welding engineers, Elmer C. Thylin and C. W. Humphreys, stayed on the job continuously from 9 a. m. Friday to 9 a. m. Sunday without sleep to supervise and perform the work directly connected with that of making the thermit weld.



TRANSIT SHED BUILT FOR BERTHS 6 and 7 of Pier A, Long Beach harbor. The 32 giant steel ribs are in place

200-Ft Spans Field Welded

BY HENRY W. YOUNG

Two tons of weld metal were required for the field welding of the 32 steel ribs supporting the transit shed built for the harbor at Long Beach, Calif. Some 70% of the welding was done on the ground

WHAT IS generally understood to be the largest clear-span transit shed in the world was built for Long Beach harbor, Long Beach, Calif. The structure constitutes berths 6 and 7 of Pier A. Its span is 200 ft and the length of the shed is 1,152 ft.

The structure is supported by 32 ribs of rigid frame construction weighing 42 tons each, a total of 1,344 tons. The total steel on the job amounts to 2,650 tons, and two tons of weld metal were required for the field welding of the rib sections. Those prominently identified with this large and somewhat spectacular undertaking are the Pacific Iron & Steel Co., the fabricator, and Henry E. Robertson Co., Inc., both of Los Angeles. Robertson did the erection work in what might be called the record time—if there were anything exactly similar to compare it with—of 45 days.

Rib Sections Prefabricated

Each rib frame was fabricated at the steel plant in five sections: the two end columns with the beginning of the arch at the top, two intermediate sections and one crown section for the center of the arch. Standard open-hearth mild steel was used for the structural components. The web plates of these sections vary from 4 ft 6 in at the widest point to 3 ft 2 in and are ¾ in. thick. The flanges at top and bottom are 16 in. wide and 1¼ in. thick. The two flange plates were welded to the web at the Pacific Iron & Steel fabricating plant to produce a giant I-beam.

Welding on the Ground

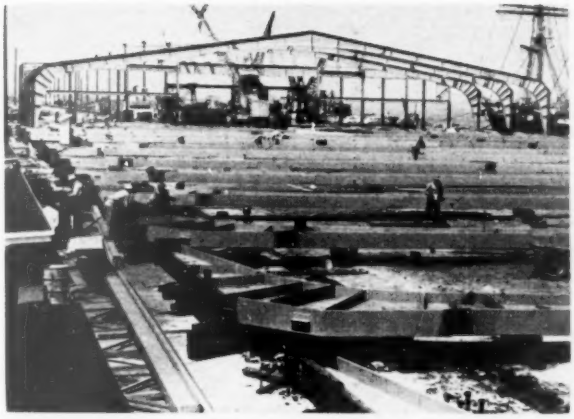
The fabricated sections of the ribs were transported to the site and laid out on blocks (Fig. 1) with the ends abutting ready for the first welding operation. Each of the ribs was placed at its proper location. The floor of the new shed, a previous paved dock floor, fortunately provided a smooth place on which to work.

Seventy per cent of the welding of the rib sections was done on the ground. With the web in the horizontal position on the ground, its abutting ends were welded on one side in the flat position (Fig. 2). The upper flange, now in the vertical position, was completely welded on what would be the top side of the rib when erected (Fig. 3). Similarly, the outside or bottom of the lower flange was vertically welded. Half of the inner or top side of the lower flange was accessible for vertical welding (Fig. 4) as was half of the underside of the top flange.

When all of the ground welding was completed, 70% of the total field welding had been accomplished. This gave a safety factor of 2.7—sufficient to allow the ribs to be raised with complete assurance that they would not fail.

The ribs were raised by means of three standard 20-ton truck cranes working together (Fig. 5). As soon as one rib was up and the anchor bolts in place and drawn up, the cranes moved on to the next and so on down the line. On the average, about eight ribs could be erected in a day. As the raising progressed, the purlins and other members were put in place and riveted.

The final 30% of the welding was done up in the air. The men worked on standard wooden scaffolds sus-



1—RIBS WERE laid out on blocks for ground welding. Web plates were horizontal and flanges vertical

2—WEBS of adjoining sections were welded together in the flat position. The web plates are ¾ in. thick

3—TOP OF UPPER flange plate is being welded in the vertical position. The flanges are 1¼ in. thick

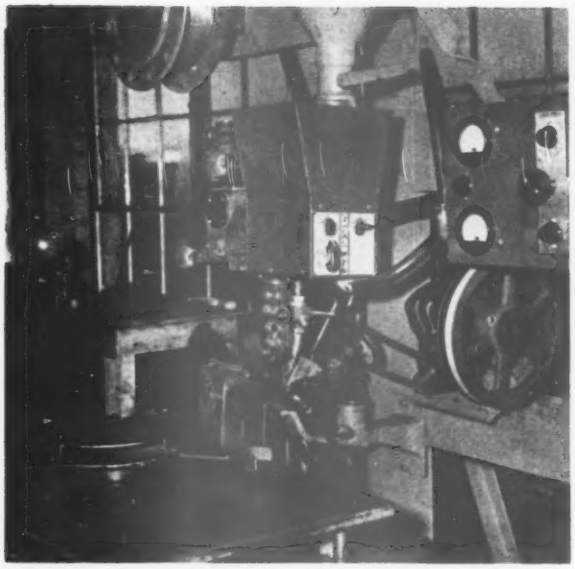
4—HALF OF INNER side of lower flange is welded vertically as is half of underside of the top flange

pended from the ribs, such scaffolds as are common in riveting and other steel erection. The work consisted of welding the remaining side of the web in the vertical position and welding one half of the inner side of each flange in the overhead position (Fig. 6). On the ground and in the air, the field welding required welds in all four positions. Regulation fillet welds were made with E-6010, 3/16 and 5/32 in. electrodes; E-6020 flat-position electrodes were used on flat surfaces and E-6015 low-hydrogen electrodes on verticals. On the average, it took one weldor four man-hours to weld a joint on the ground and about the same time to complete it in the air.

The field welding was accomplished with a field crew of nine weldors working under Superintendent James Turner and Welding Foreman W. J. Burke. One eight-hour shift was worked per day.

5—TRUCK CRANES working three together raise the 70%-welded rib. Each crane is of 20-ton capacity

6—OVERHEAD welding was necessary to complete underside of top flange and top of the lower flange



1—FIXTURE for automatic arc welding developed by Lawson Manufacturing Co., Pittsburgh, for sheet metal

2—HEATER SECTION is being through-welded. The two halves joined were pressed from 20-gauge sheets

"Welding-through"

BY H. E. CABLE
Pittsburgh District Manager, The Lincoln Electric Co.

Automatic hidden-arc welding of 20-gauge flanged halves simplifies production of gastight radiation chambers for heating units. Welds are made through the flanges like spot welds at a speed of 120 ipm

BY EMPLOYING a welding-through technique with the automatic hidden-arc process, the Lawson Manufacturing Co., Pittsburgh, has reduced the cost of making gastight radiation chambers for gas-air heating units.

The radiation chambers or heater sections vary in size and shape but are generally rectangularly shaped tanks about 4 in. thick. They are made by welding together two halves pressed out of 20-gauge sheet steel with a conventional flange for welding. The AGA specifications for gastight welds in this type of equipment call for five 1/8-in. diameter spot welds per inch or their equivalent.

USE HIDDEN-ARC EQUIPMENT

Lawson had previously adapted equipment for hidden-arc automatic deep-flux welding to bond sheets of 16-gauge and 12-gauge steel to heavy structural members. Using high currents and fast travel speeds, the weld was made directly through the sheet, molten metal of which penetrated to and fused with the heavier member beneath.

It was reasoned that by using still higher travel speeds with lower currents, two sheets of a lighter gauge of material could be welded together with the same welding-through technique. A fixture was therefore developed to arc weld automatically the flanges on the 20-gauge heater sections.

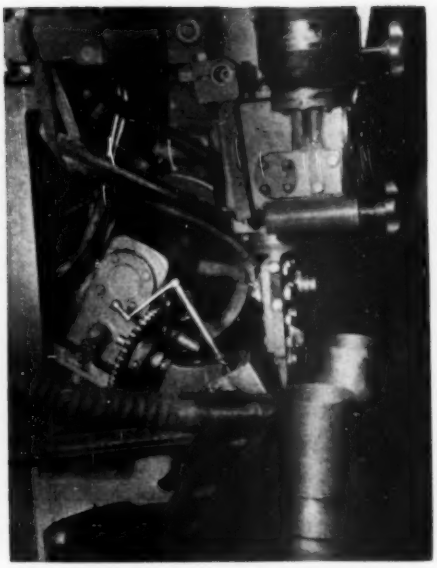
It was found to be simpler to move the flange under a stationary welding head than to move the welder around a positioned piece. When the head is stationary, a narrow grip on the flange close to the weld can be used to give the necessary travel. The section, mounted on a dolly, is guided by hand to prevent the flange from running out of the travel rollers. To secure the grip on the flange, a standard setting-down machine is modified to adapt it for power drive by means of a variable-speed d-c motor. The direct current for the motor is supplied by the exciter generator of the welding unit.

ANVIL BUILT FOR BACK-UP

Through-welding can be accomplished without backing under the lower sheet, but the possibility of uneven travel motion suggested building of a water-cooled anvil or chill into the fixture in order to prevent burn-through. In actual operation, there have been very few instances where the anvil functions as a chill. As can be seen in Fig. 1, however, it does function as a guide, against which the piece is held to locate both the weld and the amount of grip of the travel rolls.

Excess flux, dust and fumes are removed by vacuum pick-up as the welded seam passes under the arc. The flux is drawn into the separator

3—WELDING a different type of heater section from the one pictured in Fig. 2. The operator hand steers the piece around the corners



4—DRIVE MECHANISM added to setting-down machine is shown in close-up

Joins Sheet Metal

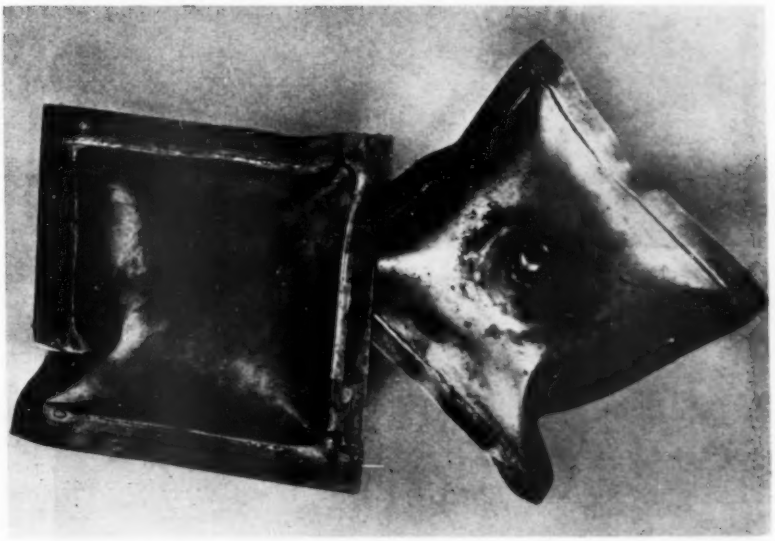
chamber, located directly over the flux hopper, and fed back into the hopper on the welding head. Dust and fumes are carried to a dust chamber situated just ahead of the blower unit of the vacuum pick-up machine.

The heater sections are first spot welded on the corners to hold them properly aligned. They are then placed on small dollies mounted on castors, as shown in Fig. 2. A more detailed view of the welding operation appears in Fig. 3 and a close-up of the fixture in Fig. 4.

Work Moves at 120 Ipm

Operators have become very proficient in handling work which travels under the arc at 120 inches per minute. This has been found to be the maximum speed at which the operator can swing the small-radius curves. The current used is 280 amp at 25 volts, and the welding head operates off a 220-volt, three-phase 60-cycle power source. The weld is made with 3/32-in. diameter copper-coated wire and granular flux.

When it is necessary to use pickled and oiled sheets, the heater sections are degreased within a reasonable time before they are to be welded.



5—PRESSURE TEST PADS after being blown up to pressure of 100 psi to test the process. The welded seams displayed no tendency toward failure

This procedure has eliminated any trouble with holes in the welds because of dirt or excessive corrosion. Practically no distortion is encountered in the heater sections, and the resistance to corrosion of the weld metal is better than that of the parent steel. Strength of the welds is indicated by Fig. 5. These pressure test pads, tested at 100 psi pressure, displayed no tendency to fail in the welds.

Cost of setting up the production unit was approximately a fifth the cost of the equipment for welding the joint by the conventional method.

1—BROKEN FLANGE on a tractor roll was built up in 15 minutes

2—WORN SHOE for corn planter was renewed by new welded section

3—BROKEN TINE of ensilage fork was mended with a brazed splint

Welding on t

Farmers need machines, and machines need fixing. Here are some tips for the practical use of an oxyacetylene welding and cutting outfit to meet the emergencies arising on the farm

BY PHIL GLANZER

SUCCESSFUL farming is a mass-production business that depends heavily on machinery and equipment. The machines, like those of other industries, need fixing from time to time, and so on-the-spot metal repair equipment has become a farm necessity.

Farm applications for welding and cutting are many and varied. Everyday welding, flame-cutting and allied processes such as hard-facing, flame-hardening and heating for bending and straightening are being used to repair parts and to make them last longer. Many farmers are using the same methods as welding shops to turn out gadgets and welded machinery that help to save time and keep production and food supply at a peak.

FARM WELDING VS JOB SHOP

The farmer of average size is usually kept so busy by farm chores that he rarely has time to spend in welding broken or wornout machinery. Job shops and farm equipment dealers in most large farming communities give farmers all the welding services they need as a general rule. The farmer will find it most advantageous to coöperate with them by taking his equipment into town to be repaired or rebuilt during the leisure months of winter.

Unfortunately, the ideal procedure is not always possible. There are times during the plowing, cultivating and harvesting seasons when machinery is bound to break down—at the most inconvenient times possible, it often seems. The farmer frantically telephones his job shop and learns that there have been so many calls of like nature that it is physically impossible for him to receive the rush service he so urgently needs. It is during these periods when every farm repair job is an emergency that welding on the farm pays most.

Working on a margin of a scant few days to get in a crop, the farmer can often save hundreds of dollars by getting a

the Farm

minor repair done at home. Sometimes the weather is such that the work has to be done on Sunday or on a holiday when the implement dealer's shop is closed. If agricultural equipment gives out at such a time, a farm welding outfit will pay big dividends. And no time is lost in getting the equipment to town and back.

Some Specific Examples

The accompanying pictures provide some very excellent examples of how an oxy-acetylene welding and cutting outfit can be used to make quick repairs. In Fig. 1, a broken flange is being replaced on a cast-iron tractor roll; the total time required to add the new metal was only 15 minutes.

Fig. 2 shows how worn shoes for a corn planter were renewed. The new section was cut from scrap automobile springs and welded to the worn edge. In Fig. 3, a broken tine on an ensilage fork was speedily mended by splinting it with a split section of ⅛-in. pipe, which the operator is brazing in place. All of these repairs can be made right on the farm if the farmer owns a welding torch and if he—or his son—has learned how to weld.

Building Special Devices

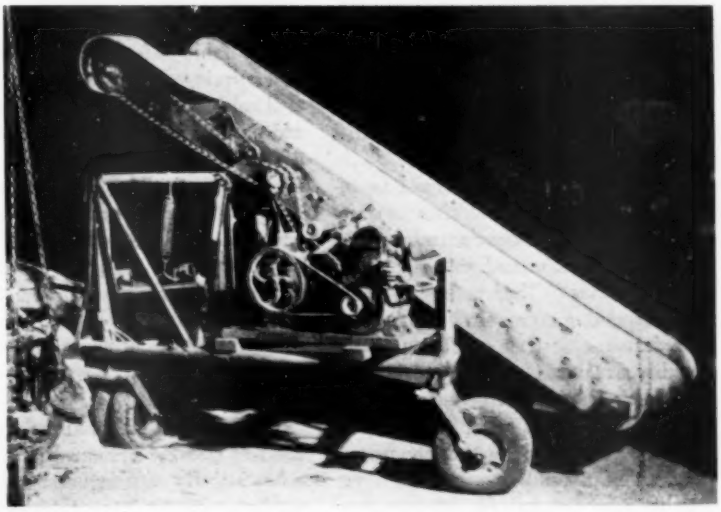
Most farmers do not build equipment. Manufacturers, as a rule, make better machinery than a farmer can build. But when farmers need devices that are not on the market to meet special requirements, the welding outfit comes in handy. Farmers and job-welding shops build such things as buck rakes, manure loaders, wagon trailer beds and frames, hay or root-crop loaders, reels for barbed wire and snowplows. Large savings also come from using welding and cutting to modernize or convert obsolete equipment. For example, horse-drawn machinery such as wheat drills and hay rakes can be adapted for motorized operation.

Some interesting examples are provided by the photographs. In Fig. 4, corncrib studding arms are being welded. The arms were flame-cut from flat bar stock, heated and formed under the torch flame.

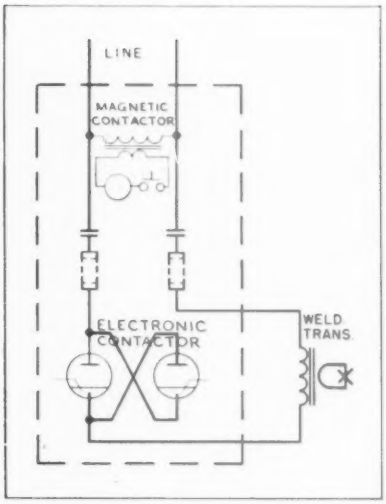
A farmer welded the snug tractor cab pictured in Fig. 5 so that he could work in comfort regardless of the weather. In Fig. 6, pipes and angles were welded together to make a handy device for loading bagged potatoes. It is powered by a small air-cooled motor.

4—CORNCRIB STUDDING irons were cut from bar stock and welded

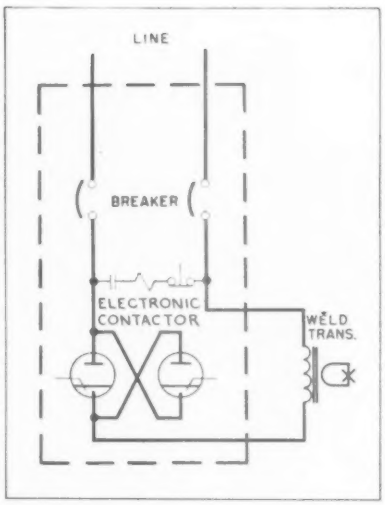
5—SNUG WELDED tractor cab permits farmer to work in the rain



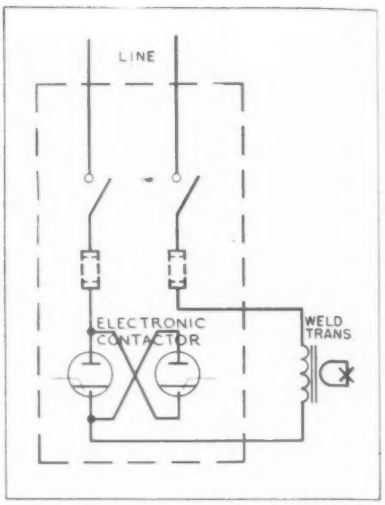
6—POTATO LOADER was made by welding pipe and angles together



1—MAGNETIC contactor schematic



2—CIRCUIT BREAKER schematic



3—SWITCH (bridge-type) circuit

How to Interrupt Control

To protect the operator of a resistance welder, he must be stopped from meddling with dangerously heavy currents. Here are three ways of disconnecting circuits when the control cabinet door is opened

BY C. B. STADUM

Manager, Resistance Welding Engineering, Westinghouse Electric Corp., Buffalo

TO PREVENT industrial accidents, the welding control manufacturer must make it virtually impossible for unauthorized persons to become exposed to dangerous currents. Too often a welder operator will open the door of a welding control when his machine is not functioning properly and touch a relay, a transformer or even an ignitron to see if it is overheated. Such an action can result in a severe electrical burn or even death. The remedy is for the electrical supply circuit to be interrupted automatically the instant the control panel door is opened.

Three methods can be used to interrupt welding control circuits safely: (1) by magnetic contactor; (2) by circuit breaker and (3) by bridge-type switches. The method selected will depend on the circuit-interrupting features desired as all types are readily available.

The desired objective is to make it impossible for an unauthorized person to be harmed by the dangerous current of a welding system but yet enable an authorized maintenance man to service the equipment when the power is on. Briefly stated, the problem reduces itself to a means for disconnecting both the power and control circuits in case an unauthorized person attempts to tamper with the controls. Other benefits such as stopping "run-away" of equipment, remote control tripping and circuit protection can be obtained by use of various types of protective equipment.

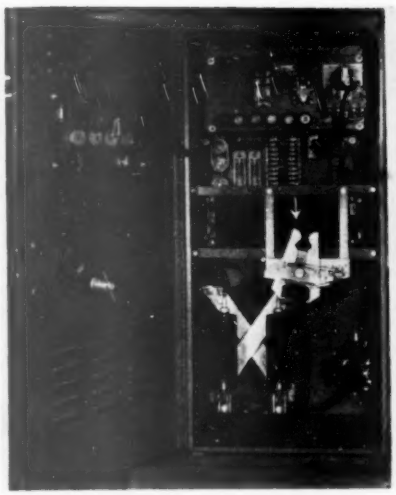
Available safety systems have the interrupting device built into the control cabinet and electrical or mechanical interlocks on the cabinet door. When the door is opened, the power is automatically interrupted and taken off the control. Occasionally, the safety device is mounted externally to the cabinet but is still electrically interlocked with the cabinet door.

MAGNETIC CONTACTOR SYSTEM

Contactor combinations can be used in a safety system. Fig. 1 shows schematically a magnetic contactor used as a circuit interrupter. The contacts are in series with the welding transformer and the electronic contactor in the conventional manner. The coil of the contactor must be at a voltage low enough to be safe to the operator. This voltage is supplied by an external source or by a step-down transformer in the welding control. A door interlock is provided in order to energize the contactor coil automatically when the door is closed.

Such a contactor combination as this requires the contactor to be totally enclosed in order to preclude exposing of the contactor terminals, which are at line voltage. The enclosed contactor can be removed physically from the control cabinet and mounted wherever is most convenient.

This system not only protects the operator but has the additional advantage that it can be remotely tripped. This is a useful feature if the control is mounted in an inaccessible position; *i.e.*, where racks of controls are mounted on balconies above the work area. Although the contactors are not primarily intended to break the welding current, they can be so



DOOR WON'T open unless the circuit breaker (see arrow) has been tripped

SWITCH interrupts circuit when door of above cabinet is opened

Circuits Safely

used in cases of emergency. Occasionally, when the ignitrons in the welding control are overheated, they will "run away" and can only be stopped by breaking the main power supply. If ignitrons do get overheated, the welder operator can use the magnetic contactor to break the circuit from the switch on his machine. Circuit protection can also be obtained as the contactor assembly has space where fuses can be inserted.

Circuit Breaker System

A second protective system is the circuit breaker system, shown schematically in Fig. 2. If no undervoltage or shunt trip is used, the breaker is mechanically interlocked with the door by means of a conventional breaker latch mechanism. It is necessary to trip the circuit breaker before the door can be opened.

For legitimate service purposes, the breaker can be reclosed by an authorized maintenance man when the door is open. It is impossible, however, to reclose the door before the breaker has again been tripped to its "off" position. When this is done, the door latch and the breaker handle will be matched, and the breaker can again be closed with the door in its normal closed position, as explained above.

A breaker system has the advantage of enabling both thermal and overcurrent protection to be obtained. By addition of a shunt trip to the breaker, tripping can be done by remote control, resulting in a simplification of the latching means. Still another advantage can be obtained by using an undervoltage trip. The power circuit will be tripped if the line voltage drops to such a low value that good welds cannot be made or to a value which will damage the electronic tubes.

Bridge-Type Switch

The third protective system, the bridge-type switch, is shown schematically in Fig. 3. This system is undoubtedly the most economical as well as the simplest. A commercially available safety switch is mounted in the control cubicle. When the door is opened, an extremely simple mechanical interlock opens the switch automatically.

A maintenance man can unlatch the interlock between the switch and control cabinet door and temporarily reclose the switch for test purposes. When the door is closed again, it automatically engages the interlock.

The switch system will probably prove the most popular method of interrupting in the long run as it is simple and low in cost. In addition, it is possible to change from one rating to another as easily as it is to change sizes of ignitrons. Suppose, for example, that the control ordered for a given job is equipped with a 100-amp disconnect switch. Should it later be desired to transfer this control to a heavier job that requires larger ignitrons and a larger disconnect switch, it will be a simple matter to replace both. A 200-amp switch is the same size as the 100-amp rating and can be slipped into the same mounting position.

Capacity and Thermal Rating

Ratings of the various types of disconnecting means for resistance-welding equipment have not yet been established. When attempting to rate a disconnecting device, there are two items that must carefully be considered: (1) interrupting capacity and (2) thermal rating.

In general, the safety devices considered here will not be called upon to interrupt the load current since "run-away" conditions are seldom encountered. Hence interrupting capacity will be a minor consideration in the rating of switches for welder service. It may be possible, therefore, to increase the thermal rating of standard switches if interrupting capacity can legitimately be ignored. Even with the present thermal ratings of switches, however, the user can cover most of his welder applications.

Under normal conditions, the average duty cycle of a spot welder is only about 5%. This means that the ratio of average to maximum current will be the square root of 0.05 or 0.223. The maximum current can then be the reciprocal of this or 4.5 times the thermal rating. In other words, a 100-amp switch can carry 450 amp and a 200-amp switch can carry 900 amp. Most spot welder applications will be within these maximum limits.

Choice between the contactor, breaker and switch systems of operator protection will depend upon what features are desired. Each of the three systems is readily available for use with functionalized controls, and each fulfills the original intent—to promote safety of personnel.

Courtesy The Budd Co.

RAILWAY CARS of stainless steel, like the one above for the Central Railroad of Brazil, are made by spot welding

What Welding Means to America

★PART FOUR: Transportation Equipment

BY T. B. JEFFERSON

This is the fourth of a series of articles based upon a report prepared from a survey conducted by THE WELDING ENGINEER. *The purpose of the survey was to determine the extent and kind of welding in the American metals industries. The first of the series, published in February,* 1949, *discussed the primary metals industries. The second, March,* 1949, *was devoted to the fabricated metals industries; while the third, April,* 1949, *covered electrical and non-electrical machinery.*—THE EDITORS.

THE AVERAGE American's closest contact with welding is probably through the transportation equipment he uses daily. Though few street car and train riders realize it, welding has contributed greatly to make their daily travels safer and more pleasant. This is true even of the rickety trolley car that appears to be ready for the junk heap — maintenance welding probably keeps it running. However, no attempt was made in the survey of the transportation equipment industries conducted by THE WELDING ENGINEER to determine the extent of welding for the maintenance of operating transportation equipment. This report is concerned only with the use of welding in the manufacture of transportation equipment and the maintenance welding undertaken to maintain production.

Courtesy The Linde Air Products Co.

AUTO INDUSTRY uses submerged-melt welding to join the differential housing to the axle assembly of a four-wheel-drive truck

Manufacturers of transportation equipment make greater use of welding, flame-cutting and allied processes than any of the other six major categories of American metals industries covered in the comprehensive survey of THE WELDING ENGINEER. The transportation equipment manufacturers surveyed included: makers of automobiles and trucks; aircraft; ships; locomotives, railroad and trolley cars; motorcycles and bicycles; transportation equipment not elsewhere classified, *i.e.*, trailers, baby buggies, etc.

In all, 1,043 plants in the transportation equipment field (Table XIII) were queried, including every plant in the United States employing 100 or more workers and every other plant having between 50 and 99 employees. A total of 410 plants in the transportation field—39% of those queried — released information on their welding and flame-cutting activities.

Of the 410 plants replying, 381 (93%) indicated a use of welding for either maintenance or production purposes. Three branches of the general classification—railroad equipment; motorcycles and bicycles; and transportation equipment not elsewhere classified—reported 100% use of welding (Table XIII). Shipbuilding reported 97%, automotive industries 92%. Aircraft manufacturers were the low group, but 90% of them use the welding processes.

MAINTENANCE WELDING

Of the 381 plants using welding, 93% (354), the highest percentage of any of the metals industries groups surveyed, use welding processes for maintenance applications (Table XIV). Arc welding is used in 92% (327 of the 354 plants) reporting welding for maintenance purposes. Oxyacetylene welding and flame-cutting are in use in 88% (312 plants), while 15% (54 of 354) employ spot and other resistance welding methods to maintain plants and machinery. As has been our experience with the other groups, many plants use more than one of the three processes (arc, gas and resistance), which accounts for the discrepancies in the totals. In some cases, arc, gas and resistance welding as well as flame-cutting are all in use in one plant. For example, the makers of railroad equipment and the makers of motorcyles and bicycles both report the 100% use of

Table XIII. Analysis of Respondents by Industries

*Transportation Equipment	Plants Surveyed	No. Plants Responding	Weld Number	Weld Percent	Do Not Weld Number	Do Not Weld Percent
Motor vehicles and equipment	599	236	216	92	20	8
Aircraft and parts	184	71	64	90	7	10
Ship and boat building and repairing	172	65	63	97	2	3
Railroad equipment	56	22	22	100	..	..
Motorcycles, bicycles and parts	20	8	8	100	..	..
Transportation equipment not elsewhere classified	12	8	8	100	..	..
Total	1,043	410	381	93	29	7

Table XIV. Maintenance and Production Welding

Transportation Equipment	Maintenance Welding Total*	Arc	Gas	Resistance	Production Welding Total*	Arc	Gas	Resistance
Motor vehicles and equipment	201	183	176	27	176	154	119	115
Aircraft and parts	59	51	52	12	57	48	50	37
Ship and boat building and repairing	60	60	53	7	57	56	49	17
Railroad equipment	21	21	21	6	74	22	21	15
Motorcycles, bicycles and parts	7	7	7	..	8	7	7	4
Transportation equipment not elsewhere classified	6	5	3	2	6	6	3	4
Total	354	327	312	54	326	292	243	192

The figures for arc, gas and resistance welding exceed the total because of duplication of types of welding within plants.

Table XV. Sizes of Plants

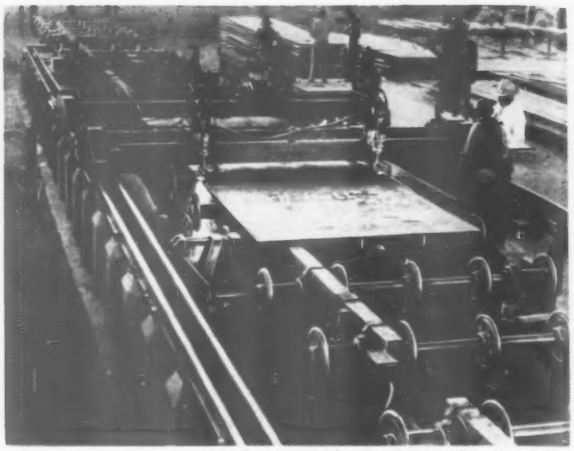
Transportation Equipment	Number of Employees 50-99	100-499	500-999	1,000-2,499	2,500+	Total
Motor vehicles and equipment	19	108	29	28	32	216
Aircraft and parts	9	27	8	7	13	64
Ship and boat building and repairing	7	30	8	9	9	63
Railroad equipment	..	8	5	3	6	22
Motorcycles, bicycles and parts	1	4	1	2	..	8
Transportation equipment not elsewhere classified	4	4	..	..	..	8
Total	40	181	51	49	60	381

Table XVI. Number of Weldors

Transportation Equipment	Number of Employees 50-99	100-499	500-999	1,000-2,499	2,500+	Total
Motor vehicles and equipment	111	1,386	632	893	7,335	10,357
Aircraft and parts	25	88	105	255	682	1,155
Ship and boat building and repairing	46	983	462	536	2,347	4,374
Railroad equipment	....	351	339	350	1,265	2,305
Motorcycles, bicycles and parts	5	49	22	300	....	376
Transportation equipment not elsewhere classified	23	85	....	....	....	108
Total	210	2,942	1,560	2,334	11,629	18,675
Average per plant	5	16	30	47	195	48

Courtesy Ryan Aeronautical Co.

AIRCRAFT AND spot welding are linked together almost as inseparably as ham-and-eggs. Here stainless-steel half stampings are being spot tacked together



Courtesy The Linde Air Products Co.

SHIPBUILDING industry is one of the heavy users of flame-cutting as well as welding processes. Above multitorch machine is being used to cut hull plates

both arc and gas welding for maintenance.

It is readily seen from Table XIV that welding plays a most important part in the maintenance of the machinery required in the production of transportation equipment. There is, perhaps, a special reason for this —transportation equipment is welded equipment. Manufacturers who have learned the value of welding for production will most certainly make full use of it for maintenance. As one example, consider the auto industry.

In automotive plants, the welding of tools and dies saves thousands of dollars, and other thousands are saved in down time which might have been incurred while awaiting for new dies to be made. The same is true of all branches of the transportation equipment industry, most of which are dependent to a major degree on stamping, blanking, punching, shearing or other press operations for production. Despite the degree of preventive maintenance, there are always breakdowns in machinery. It is during these emergencies that welding steps into the spotlight.

Arc welding is the most used maintenance process in three transportation groups, is equal to gas welding in the two groups reporting 100% use of both processes (railroad equipment, motorcycles and bicycles) and is exceeded by gas welding only in the aircraft industry. The exception is readily understood inasmuch as gas welding has been the predominant production process of the aircraft industry since it began to grow.

Production Welding

The overall production picture indicated that 86%—326 of the 381 plants doing welding—are using arc welding, gas welding and flame-cutting and/or resistance welding in the production of their specific types of transportation equipment. Ninety per cent of the 326 plants (292) doing production welding are using the arc process. Oxyacetylene welding and flame-cutting are the production processes of 243 (75%) plants and resistance welding is employed in 192 (59%) plants. The overall production welding figure—86%—and the production figures for the individual processes in the transportation equipment field represent the highest production uses of welding in any of the branches of the American metals industries surveyed.

It is not surprising that welding is so extensively used in the production of transportation equipment. Welding is used to fabricate all the modern streamlined trains and Diesel locomotives. Not too long ago a major freight car builder announced that henceforth all the cars of one plant would be welded.* The importance of welding to shipbuilding is attested by the fact that over 5,000 ships of welded or partially welded construction were built during the war years. Not in the small pleasure boat class, these ships included warships, tankers, ocean-going freighters and transports. Production is continuing in the latter categories. Welding has always been vital to the production of the automobile, and the extensive use of welding has probably helped as much as anything to make it possible to price the modern automobile within the purses of most Americans. The importance of spot welding to aircraft production has been so often stressed that it is trite to talk about it.

*See "No More Rivets," The Welding Engineer, September, 1948.

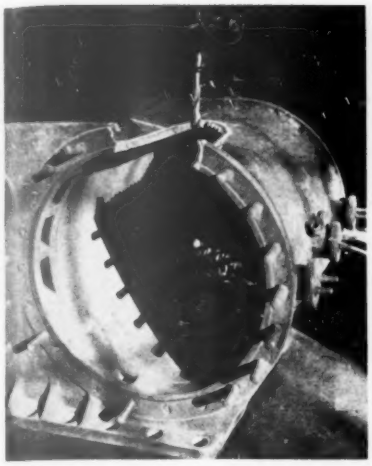
Weldors per Plant

Table XV contains data on the size of the plants that do welding. The plants covered are divided into five employment categories ranging from the plants that employ 50-99 people up to those with 2,500 or more employees. The number of weldors employed in each of these five classifications is shown in Table XVI.

By correlating Tables XV and XVI, we may find a marked increase in the number of weldors that are employed in a plant as the size of the plant increases. This is an indication of the essentiality of welding in the production of transportation equipment. The larger the plant, the greater the number of weldors who are required to maintain schedules.

It will be found that the smaller plants have an average of five weldors per plant. In the medium-size plants (500-999 employees) there is an average of 30 weldors, while the largest plants surveyed show an average of 195 weldors. Average number of weldors for the 381 plants, large and small together, is 48.

Next Month: *Miscellaneous Metals*



1—DRILLING CRACK with radial drill prepares cast-iron cylinder

2—CARBON PLATES are tongued and grooved to fit snugly together

3—WELD METAL is deposited until the U-shaped opening is filled

"Hot Welding" Steam Cylinders in Germany

German technicians have invented a method of arc welding that calls for a carbon mold to be built about the work. The space left between the carbon plates is filled with weld metal by the metal-arc process

BY JOHN J. CHRISTIE
Berlin Bureau, McGraw-Hill World News

HOT WELDING of cast iron is a German technique differentiated from conventional arc welding by its preliminary work and the operation. The two pieces are not butt welded nor is a welding groove created. Instead a cast mold is formed around the part to be welded, which mold is filled with fluid metal as in thermit welding. The molds used are made of conducting material because it is essential to draw an electric arc from all parts of the mold.

REPAIRING A STEAM CYLINDER

Fig. 1 shows the first phase of operation. The crack, which goes through the whole length of the cylinder, is drilled with a radial drilling machine to follow a U extending from the edge to the middle of the cylinder. The second part of the crack will be prepared in the same way after the first part has been welded and cooled off. Therefore, two operations have to be carried out for the reconditioning of the cylinder. The drilled part of the crack is lined with graphite plates having tongues and grooves to enable them to be fitted together.

Fig. 2 shows the carbon plates on the inside of the cylinder. An exactly similar form is mounted on the outside. The cylinder is now lowered into an annealing pit, and charcoal is heaped around it. The charcoal fire is blown by air draft.

METHOD OF WELDING

Fig. 3 shows the welding operation. The weldor wears fireproof overalls, wooden shoes and a protective helmet. The electrode holder has a safety device. Cast bar-electrodes of 12 mm (15/32 in.) are used. A melting bath is made with these in the U-shaped opening. The space between inner and outer carbon plates is filled with weld metal, building up from the bottom to the top. After welding has been finished, the cylinder is allowed to remain in the pit until it is completely cool in order to avoid a re-cracking. Time requested for this may be as long as 10-12 days for large pieces. When the cylinder is deemed sufficiently cool, it is taken out of the pit, the carbon plates are removed and a thorough cleaning is done by sandblasting. The cylinder is then put back into working condition and tested in the customary manner by water and steam pressure.

4—INSIDE of cylinder shows large amount of weld metal needed

Fig. 6 gives an inside view of the welded cylinder. Here the added part has been traced by chalk lines.

Present-day austerity in occupied Germany forces employment of all available means for repair work. The method described above is said to have proved very satisfactory for making large welds, though more costly than the accepted American method of welding in replacement pieces.

WELDING DISTRIBUTORS should be interested in how to build such attractive displays as these (see page 22)

NWSA in Cincinnati

Fifth annual meeting of the National Welding Supply Association will be held at the Hotel Gibson in Cincinnati on May 11, 12, 13

In a three-day meeting, the National Welding Supply Association hopes to make its fifth annual convention the most interesting and constructive yet held. Convention headquarters will be at the Hotel Gibson, Cincinnati. The meetings begin on Wednesday, May 11, and continue through Thursday and Friday.

J. F. Lincoln to Talk

Registration of delegates will start at 9:00 a.m., Wednesday, and the opening session begins at 10:00 a.m. J. F. Lincoln, president of The Lincoln Electric Co., Cleveland, has been selected to keynote the opening session with an address on "Welding and Its Future." A general business session will follow Mr. Lincoln's talk.

Two luncheons will be held on Wednesday: one for the delegates and guests, the other for the officers, executive committee and board of trustees. There will be no business sessions on Wednesday afternoon in order to allow time for a plant visitation through the mill of American Rolling Mill Co. at Middletown, O. All who attend the convention will be welcome to visit this plant. Transportation from Middletown to Cincinnati will be provided by busses, and visitors will meet at 2:30 p.m.

The second day morning session again opens at 10:00 a.m. and is a general session followed by a luncheon. Beginning at 2:00 p.m., there will be a distributors' session, at which association members will discuss the common problems of the distributor. An informal dinner is scheduled to begin at 6:30 p.m.

The Friday morning session, which also opens at 10:00 a.m., will be a general session of the entire membership. On this occasion the names of the new officers will be announced, and they will be installed for the coming year.

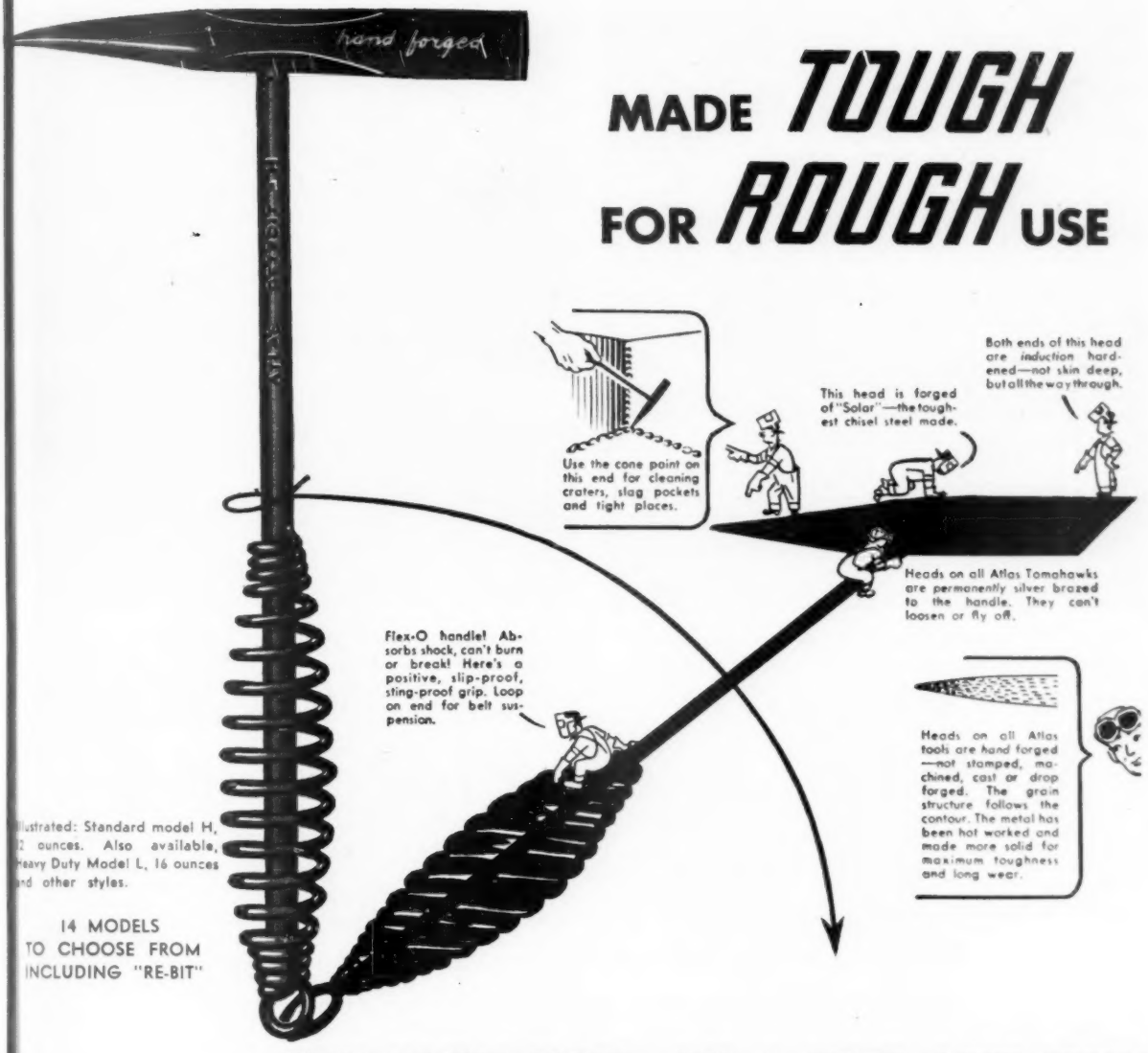
More detailed information regarding the convention speakers and their topics was not available at the time The Welding Engineer went to press. It is safe to say, however, that the membership of the program committee insures that a strong program will be presented.

Entertainment for Ladies

A ladies' program has also been arranged. This includes a luncheon and card party, scheduled at the Cincinnati Club at 12:30 p.m. on May 11, and a sightseeing tour of the city beginning at 1:45 p.m. on May 12. The ladies are also invited to participate in the informal dinner on Thursday evening.

Present officers of the association are: Ralph E. Chase, Chase Welding Supply Co., Inc., Benton, Ill., president; R. S. Mars, W. P. & R. S. Mars, Duluth, Minn., senior vice-president, and five district vice-presidents: Howard Proctor, Acme Welding Supply Co., Houston, Texas; Hal Savage, Arizona Welding Equipment Co., Phoenix, Ariz.; W. C. Starcher, Spencer, W. Va.; J. N. Alcock, Saginaw Welding Supply Co., Saginaw, Mich., and J. W. Albiston, Maine Oxyacetylene Supply Co., Auburn, Me.

MADE *TOUGH* FOR *ROUGH* USE


hand forged
Use the cone point on this end for cleaning craters, slag pockets and tight places.
This head is forged of "Solar"—the toughest chisel steel made.
Both ends of this head are induction hardened—not skin deep, but all the way through.
Heads on all Atlas Tomahawks are permanently silver brazed to the handle. They can't loosen or fly off.
Flex-O handle! Absorbs shock, can't burn or break! Here's a positive, slip-proof, sting-proof grip. Loop on end for belt suspension.
Heads on all Atlas tools are hand forged—not stamped, machined, cast or drop forged. The grain structure follows the contour. The metal has been hot worked and made more solid for maximum toughness and long wear.

Illustrated: Standard model H, 32 ounces. Also available, Heavy Duty Model L, 16 ounces and other styles.

14 MODELS TO CHOOSE FROM INCLUDING "RE-BIT"

YOU CAN'T MISS—ON A TOOL LIKE THIS!

ask any good welder

It's an Atlas Tomahawk and that means a lot to a welder who has tried them all. For cleaning off weld spatter and slag, it can't be beaten.

It's solid and well balanced. The head is hand forged, induction hardened and silver brazed, to the metal shaft. It's made to take real punishment.

The grip is indestructible metal, too, non-split, non-burn, non-sting. A variety of models and weights to choose from including our new "RE-BIT" models.

*Contact your local welding supply dealer or write direct for literature on the complete line of Atlas Welding Cleaning Tools.

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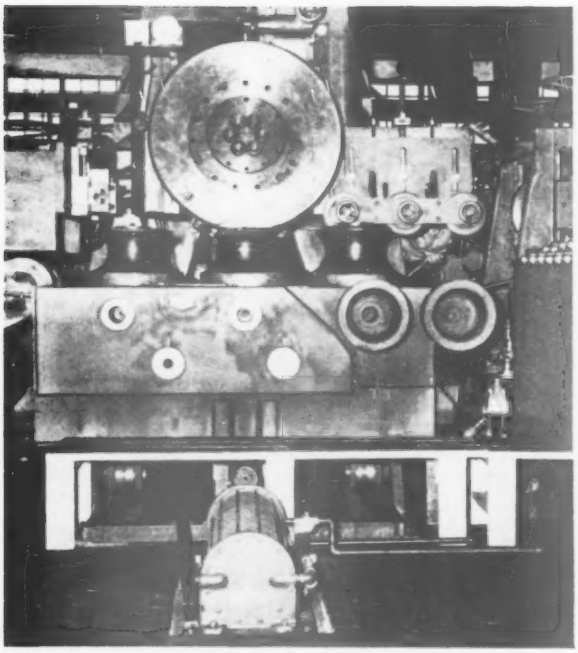


FRONT OF WORLD'S largest resistance welder. Its mammoth electrode wheels are a pair of 54-in. discs

PIPE GOING through the squeeze rolls and under the welding wheels. Pipe up to 16-in. OD can be handled

World's Largest Pipe Welder

(See Our Front Cover Picture)

Pipe up to 16-in. diameter can be butt welded in continuous production in a new tube mill built for service in Argentina. The big electrode wheels measure 54 in. in diameter and weigh 2,000 pounds

BY CLYDE B. CLASON

WORLD'S largest disc electrodes and largest rotating transformer for a-c resistance welding are both to be found in a large continuous tube mill in Argentina. The mill was recently built by The Yoder Co., Cleveland, for Di Tella Corp., Buenos Aires, and is to be used for the production of oil-well casing and line pipe of quality to meet the specifications of the American Petroleum Institute.

THREE-TON TRANSFORMER

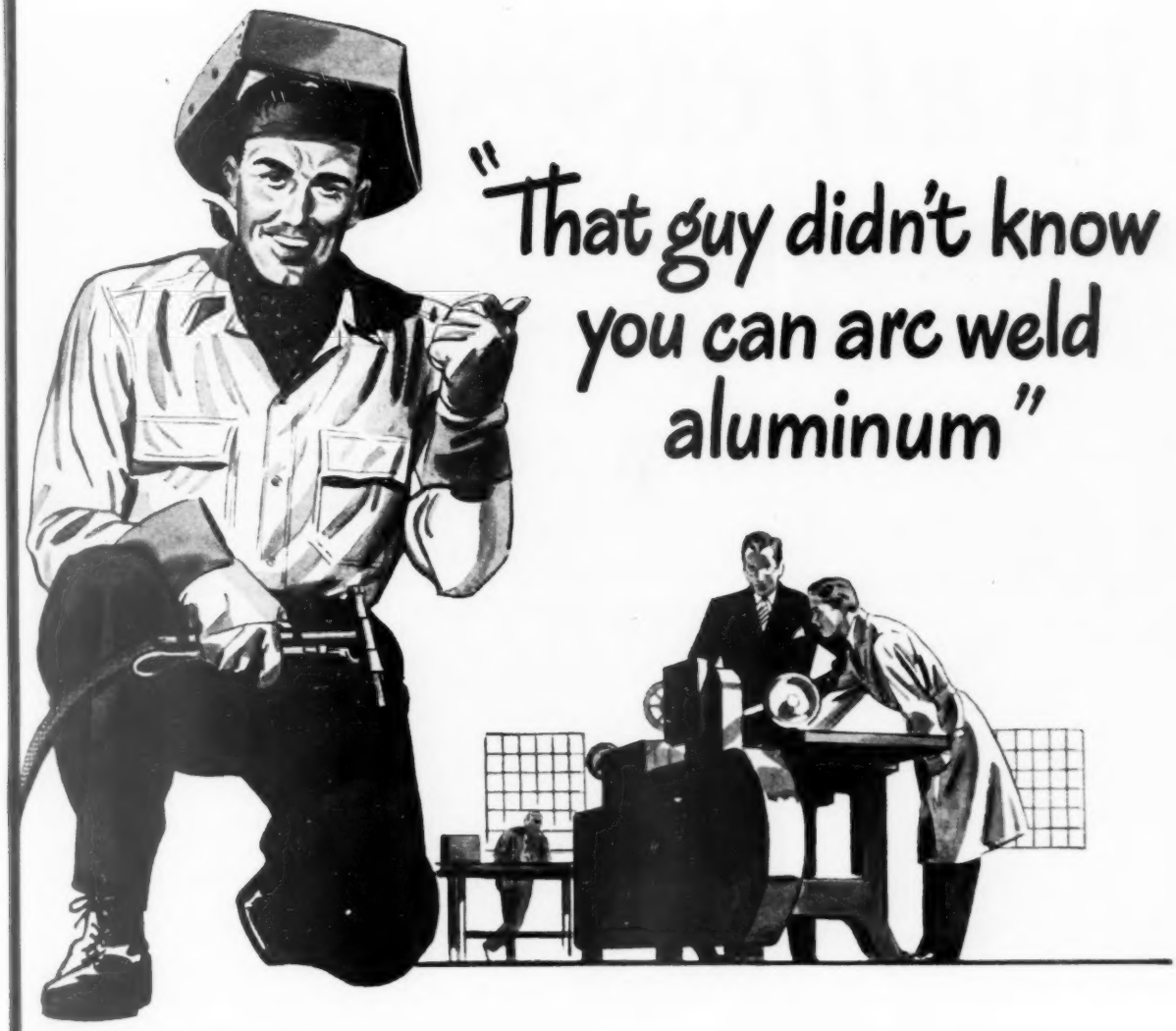
The transformer has a capacity of 1,500 kva and weighs approximately 6,000 pounds. Its 440-volt, 60-cycle, single-phase input is derived from a 1,500-kva motor-generator set driven by a 1,750-hp synchronous motor. Current for single-phase resistance welding is delivered at 150,000 amp, 10 volts, and is controlled at the operator's panel through field control of the generator.

The complete welder unit weighs over 180,000 lb. Its giant electrode wheels are a pair of solid copper discs 54 in. in diameter, 3 15/16 in. thick and weighing one ton for the pair. Their great weight is necessary to supply the required welding pressure. They are made of WW-2 Metal (RWMA Class 2). The current is carried through one wheel to the pipe and then through the other wheel to complete the circuit. The two wheels are mounted on the same axis instead of above and below as in conventional seam welding.

The mill can handle cold steel plate of from 0.187 to ½ in. thickness and form pipe of from 4½ to 16 in. OD. Its operating speeds vary from 15 to 60 feet per minute. Operating at a speed of 60 fpm, it can produce in a day 57,600 feet or 1,195 tons of 12¾-in. pipe of 0.312-in. wall thickness. That daily output represents 2,880 miles of pipe in a year. At a speed of 20 fpm, the mill can produce 19,200 ft a day of its largest-size pipe—16-in. diam. and ½-in. wall thickness.

A MILLION-DOLLAR BABY

Cost of the forming unit, welding machine and sizing mill is approximately $700,000. Auxiliary equipment, including end trimmers, threader, hydrostatic testing, etc., runs to another $350,000, bringing



"That guy didn't know you can arc weld aluminum"

You tell him. Show him the spatter-free, oxide-free seam that you've just finished on the Alcoa Aluminum pipe joint. Let him take a look at your argon-shielded, tungsten arc torch. Tell him you've been welding aluminum for the past 20 years.

Take him over to that outfit next door that makes aluminum storm windows. Show him the battery of resistance welders that knocks out 100 Alcoa Aluminum frames an hour.

Tell him about your buddy, who works over at the railroad car shops. Give him the word about those liquid-proof, pressure-proof Alcoa Aluminum tank cars he arc welds.

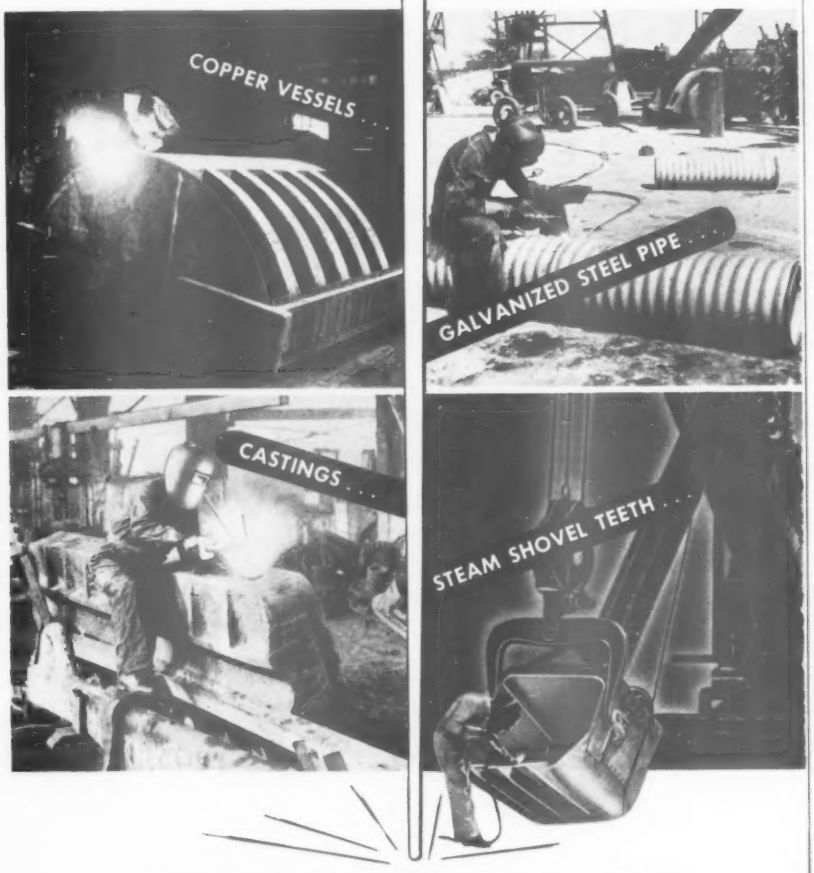
As a matter of fact, we could do a bit of showing ourselves. We take our own medicine, barrels of it. Over in the Alcoa plant at New Kensington, Pennsylvania, some days we weld over 1500 Alcoa Aluminum beer barrels.

We've written a book called "Welding and Brazing Alcoa Aluminum". It's packed full of technical data and how-to-do-it welding procedure for all the welding processes. Your skeptical friend can have a free copy. His nearby Alcoa Sales Office will give him one, or he can write ALUMINUM COMPANY OF AMERICA, 1751 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

in all cases



Speer Carbon Electrodes Give Stronger Welds at Low Cost!

Day after day, carbon arc welding proves itself in dozens of uses by giving hard, strong welds at low cost.

Speer Carbon Electrodes put top efficiency and economy into this versatile method. Greater current carrying capacity — even burning arc with high heat value — 33% longer life — 22% harder, are characteristics that combine to give you 13% more weld inches per electrode.

Get the economy and high efficiency that go with uniformly dense Speer Electrodes. Into the making of each one goes technical knowledge that has made Speer a leader in the welding field for 50 years.

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brushes · contacts · welding electrodes · graphite anodes · rheostat discs · packing rings · carbon parts

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the total cost to over $1,000,000.

Motor-driven squeeze or holding rolls insure a positive drive and steady flow of tube blanks under the big electrode wheels. In order to facilitate rapid roll change, the entire squeeze roll base is mounted on wheels and is arranged with an air cylinder to enable the operator to withdraw the base from under the welder when changing rolls.

The entire rotator assembly is motor-driven through an overrunning clutch by a variable-speed motor. A tachometer driven from the periphery of an electrode enables the operator to set the speed of the electrodes to accord with that of the tube mill. Speed variations due to pipe slippage or inaccuracies in set-up are absorbed by the overrunning clutch.

Electrode pressure is varied by an elevator mechanism which raises and lowers the entire rotator assembly. The amount of pressure is measured on the dial of a "Statimeter" permanently mounted on the unit.

A lathe-type compound is provided to minimize the time required for electrode dressing and for changing the contour within the pipe size range of the electrodes. This feature obviates the need of removing the electrode discs in order to turn them.

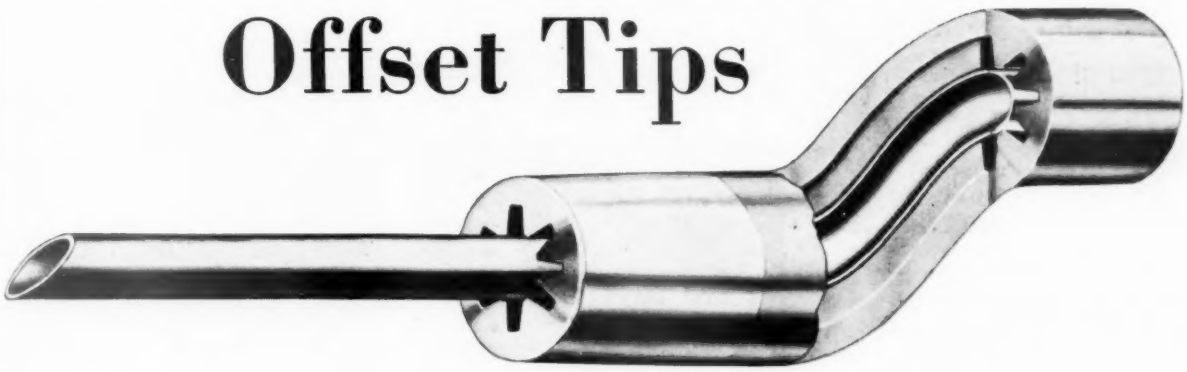
Removing the Flash

The flash or upset material is removed outside the pipe by means of a carbide-tipped scarfing tool mounted on the welder side of the pullout pass. Internal flash is removed with a similar type of tool mounted in a mandrel body. The mandrel is the approximate size of the internal diameter of the pipe being welded and is held by a rod anchored in the forming mill at a point at which the pipe is still open. The metal cut away is balled within the mandrel body and is expelled as the tail of the pipe passes by.

Yoder has orders for two more identical machines of like size and capacity: one for The Kaiser Co. of California and the other for Page-Hershey Tubes, Ltd., of Canada. Yoder has also been approached by a company in India with regard to the construction of a mill with capacity for making seam-welded pipe up to 30-in. OD.

Acknowledgment is made to Weiger Weed & Co., division of Fansteel Metallurgical Corp., for assistance in the preparation of this article.

MALLORY Fluted *and* Bent Offset Tips



The Ultimate in Offset Tips – *A Mallory Exclusive!*

First, Mallory made news with the bent offset tip that carried the water to the welding face!

Then Mallory perfected the Mallory Fluted Tip† — a 70% increase in cooling area, faster heat dissipation, reduced mushrooming, required less frequent dressing—all at no increase in price!

Now Mallory Creative Research has successfully combined these two great tip features into one. Now *you* can have the ultimate in *your* welders: fluted water holes in bent offset welding tips . . . and you can have them through Mallory and Mallory alone!

Making news in the welding field is an old story at Mallory. Again and again, Mallory has come through with ideas, practical ideas—because Mallory has underwritten more extensive research than any other maker of resistance welding alloys, tips, holders and dies.

Which means if you want the best *first*, check with Mallory!

In Canada, made and sold by Johnson, Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

SERVING INDUSTRY WITH

Capacitors — Rectifiers
Contacts — Switches
Controls — Vibrators
Power Supplies
Resistance Welding Materials

†Patent Applied For

P. R. MALLORY & CO. Inc.
MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

New Products to Use

ANGLE JAWS of new holder allow shorter electrode stubs and better view of the arc

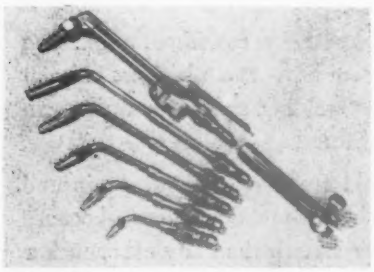
Electrode Holder

BENT jaw design of the "Ben-Nek" electrode holder allows the operator to use electrodes down to very short stubs and also offers an unobstructed view of the arc at all times.

Jaws are reloaded by pressing the trigger lever to open them and then placing the electrode in one of five gripping channels. Choice of five angles is said to eliminate the bending of electrodes for certain jobs.

Other features are: unbreakable plastic over copper jaws; simple cable connector that takes various diameters without adjustment; no separate springs, collets or small parts. Weight of the holder is 16 oz and size 1/16 to ¼ in. electrodes may be used with it. BEN-NEK HOLDER, INC., 125-129 Short Beach Rd., East Haven, Conn.

* * *



SWIVEL-ACTION tips are seated in torch body with fingertip pressure on nut

Oxyacetylene Assemblies

THREE new oxyacetylene welding torches and cutting assemblies incorporate the "Flo-Trol," a feature to prevent conditions leading to premixing of gases and backfire. This device consists of a combination of sealing elements, cooperating with a series of gas-directing channels and a spring-loaded diaphragm valve. Welding or cutting tips may be quick-changed and seated with fingertip pressure on the tip nuts. Tips may be swiveled in any position, even with flame lighted.

The "Lifelong" series features torch bodies and cutting assemblies for light, medium or heavy-duty welding. The "Midline" series is for light and medium welding in garages and manufacturing plants. The "Airline" series is for light-metal welding and cutting. SMITH WELDING EQUIPMENT CORP., 2621 Fourth St., S. E., Minneapolis 14, Minn.

* * *

FINISH grinding a welded gear tooth with a "Bayflex" flexible grinding wheel

Resilient Grinding Wheel

EACH grit in the new "Bayflex" grinding wheel gives somewhat as it strikes the metal because it is imbedded in a cotton-fibre base. Thus each small grit remains sharp much longer and so does the wheel as a whole.

The "Bayflex" wheels may be used for finishing welds in mild steel, stainless steel, bronze, aluminum or cast iron. Best results are obtained when the wheel is mounted on right-angle-head grinders or sanders. Speeds of 4,000-5,000 rpm are recommended for 9 in. diam wheels, ⅛ in. thick and 7,000 to 8,000 rpm for 7 in. diam wheels, ¼ in. thick.

A recommended adaptor for use with the wheels is available and fits all standard machines. A safety guard is also available. BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

* * *

SILVER solder, welding rods, galvanizing powder, fluxes, are in compact kit

Gas Welding Kit

THE new "Doc Alloys" kit includes silver solder, ten types of gas welding rods, a galvanizing powder and eight fluxes—all contained in a metal box measuring 2 by 4½ by 20½ in. The rods are individually color marked and are in labeled pockets in a leatherette roll. An instruction booklet and a chart of the contents are also included.

This kit of low-temperature welding rods is expected to find use with gas weldors on contract jobs, on ships, farms, and for maintenance weldors in factories, quarries, foundries, etc. The kit is also a useful sampler for the distributor. ALL-STATE WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y.

* * *

PORTABLE a-c welder has 20 to 125 amp output at 50% duty cycle, weighs 98 lb

Small A-C Welder

CAPABLE of being carried in an automobile trunk or other small capacity carriers, the new Model 125 "Junior Metal Zipper" a-c arc welder weighs only 98 lb, measures 14½ in. wide by 10 in. deep by 16 in. high. Output ranges from 20 to 125 amp, at a duty cycle of 50% and a power factor of 66%. Accessories include welding and power cables, electrode holder, ground clamp and welding helmet. It can be used with the Mid-States high-frequency arc stabilizer. MID-STATES EQUIPMENT CORP., 2429 South Michigan, Chicago 16.

* * *

COLD solder is applied to hole with spatula, center. At right, hardened solder is shown after sanding in preparation for paint

Cold Aluminum Solder

DENTS and damaged areas in automobile bodies may be filled with a new cold solder composed of aluminum powder and a solvent. Since no heat is needed, the damaging of adjacent painted surfaces is avoided.

The metal around the dent must first be cleaned by sanding or buffing. The solder is doughlike—about the consistency of plastic wood—and is put on with a spatula. After it hardens, it may be filed or sandpapered to a smooth finish for painting. REYNOLDS METALS CO., 2500 So. Third St., Louisville, Ky.

MORE CAPACITY claimed of monolithic filler for new Aetna acetylene cylinders

Acetylene Cylinder

LIGHTER weight and new type of monolithic filler are features of Aetna acetylene cylinders. The filler is said to permit faster filling and more gas capacity.

Four sizes are being produced at present: 39 by 12 in. diam., 30 by 10 in. diam., 30 by 8 in. diam., and 24 by 6 in. diam. Bottom rings come as standard equipment. Valves and commercial fittings are supplied with each cylinder, and caps are included if required. Each cylinder has five safety plugs and is made in strict conformance to I. C. C. specifications. AETNA CYLINDERS, INC., 714 Fisher Bldg., Detroit 2, Mich.

* * *

ADJUSTABLE pilot light, trigger control, needle valve featured on new torch

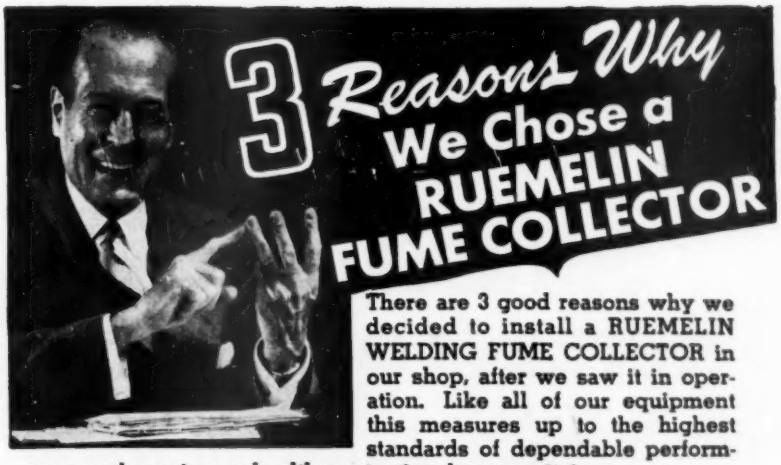
Air Acetylene Torch

EITHER propane or acetylene may be burned with atmospheric air in a new series of general-purpose torches suitable for radiator and battery repair, body work, silver brazing, refrigerator and condenser work, paint removal, fine soldering or heating jobs. Illustrated is torch C-48, which has "Weldimatic" trigger control, adjustable pilot light and needle valve adjustment. Other models have heavy-duty extensions, special burners and other accessories. WELDIT, INC., 990 Oakman Blvd., Detroit 6.

* * *

Set-Up Pumice

BACKING up and alignment of small metal parts for welding is facilitated by White's new "set-up pumice." Mixed with water, the pumice can be molded to any shape to support parts or to protect threaded sections or areas likely to warp from overheating. For back-up, it can be moistened and placed directly underneath the welded parts. It is claimed not to "pop" under the hottest flame and can be used over and over by moistening with more water. L. B. WHITE CO., 422 North 10th St., La Crosse, Wis.

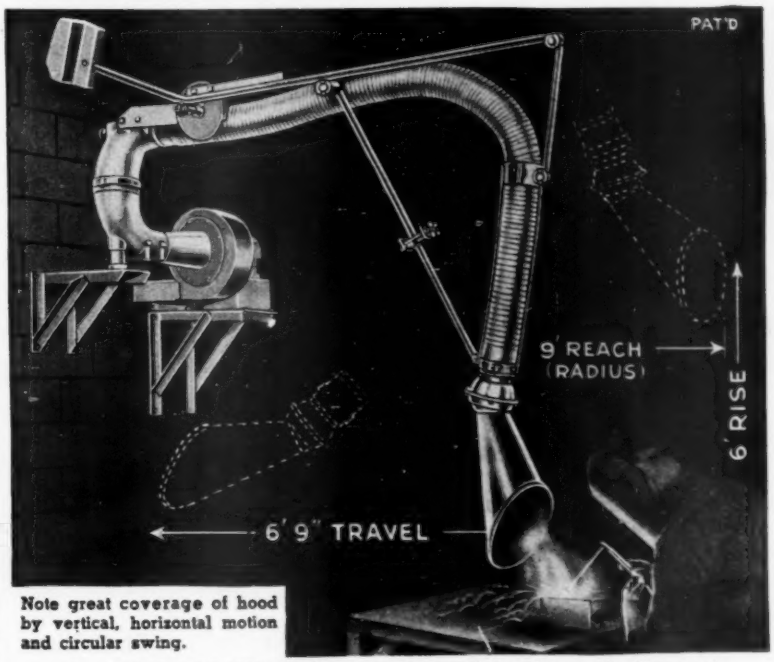


There are 3 good reasons why we decided to install a RUEMELIN WELDING FUME COLLECTOR in our shop, after we saw it in operation. Like all of our equipment this measures up to the highest standards of dependable performance and maximum health protection because it is:

1. MORE EFFECTIVE — The powerful suction of the RUEMELIN FUME COLLECTOR efficiently draws out noxious gas, smoke and heat at the source. It provides great coverage, minimizes building heat loss, reduces welder's fatigue and guards employee's health — all to increase shop efficiency and output.

2. COMPLETELY FLEXIBLE — It is easily installed with least expense. When in operation, its hood instantly and conveniently adjusts for greater proximity to welding area without tedious adjusting devices.

3. UNIVERSALLY APPROVED — The RUEMELIN FUME COLLECTOR has the approval of state industrial commissions and compensation insurance companies. In addition it has the support of the thousands of users who have found their Ruemelin installations so satisfactory on the job.



Note great coverage of hood by vertical, horizontal motion and circular swing.

Standard Model D-5310 with hood reaching out 9 feet from wall. Also available in Long Reach Model D-5342 with hood reaching out 15 feet from wall.

For complete details write for Bulletin 37-D just off the press.

RUEMELIN MFG. CO.

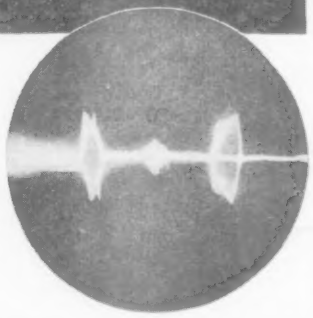
MANUFACTURERS AND ENGINEERS
SAND BLAST AND DUST COLLECTING EQUIPMENT
3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

A5490-5/49-R

SPERRY

ULTRASONIC REFLECTOSCOPE

Reveals Hidden Defects in Welds



- *Portable Unit for Quick Set-Up*
- *Instantaneous Visual Indications*
- *Controlled Sensitivity to Meet Quality Standards*
- *Low Inspection Cost*

With the Sperry Reflectoscope many butt welds can be tested quickly and economically for voids, inclusions, and lack of fusion. By employing angle beam transmission of ultrasonic vibrations, the Reflectoscope locates hidden defects as the operator moves the searching unit parallel to the weld.

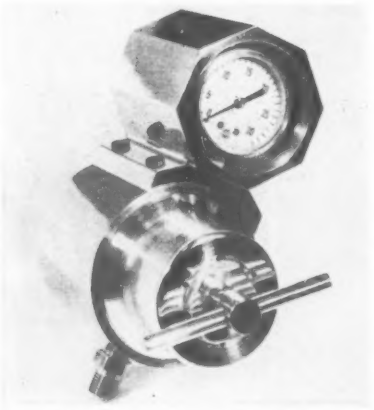
The Reflectoscope can be adjusted to various standards of sensitivity to meet quality control requirements in production testing. It is easily portable and requires only one man for set-up and operation. Operates on 115-volt, 60 cycle current.

For complete details on the Reflectoscope and for more information about the Sperry weld testing method, write for Bulletin 3001 and Data Sheet 3021-E-5.

SF-153

SPERRY **SPERRY PRODUCTS, INC.**

DANBURY, CONN.



ONE-PIECE nozzle, seat, spring and filter featured on regulator made of aluminum

Gas Regulator

NOZZLE, seat, seat pin, spring and filter are an integral unit in the new "Oxo" gas regulator. Made of aluminum with stainless steel wearing parts, it also has a special guard to protect the gauge.

It is claimed that the bonnet, diaphragm and nozzle unit can be changed in two minutes employing one common socket wrench. The seat is protected against flashback by the seat-pin design within the nozzle. Dual equalizing chambers dissipate heat when the cylinder valve is suddenly opened. THE OXO WELDING EQUIPMENT Co., 1235 West 95th St., Chicago 43.

* * *

STEPLESS current control from 15 to 170 amp is featured on Birdsell a-c welder

A-C Welder

FOR general-purpose welding, the Model 170 Birdsell offers a range of amperages between 15 and 170 on either 110 or 220 volt lines. It is recommended for all types of a-c welding within the capacity of a 5/32-in. electrode, such as farm welding, garage work and intermittent industrial use.

Stepless control is obtained with a single bar. Open-circuit voltage is 53 volts, less than the safety minimum. Each welding transformer is wound uniformly so that two or more welders may be coupled together for heavy work. BIRDSELL MFG. CO., INC., 500 San Antonio Rd., Los Altos, Calif.

(*Continued on page* 56)

Trade Names* of Copper Electrodes and Comparable AWS Designations†

Designation	E Cu	E CuSn-A	E CuSn-C	E CuNi	E CuSi	E CuAl-A	E CuAl-B	E CuAl-C	E CuAl-D	E CuAl-E
Air Reduction Sales Co.		Airco 70			Airco 72	Airco 100	Airco 116	Airco 120	Airco 125	Airco 130
Alloy Rods Co.		Cupro-Arc C								
All-State Welding Alloys Co., Inc.	All-State 26	All-State 22	All-State 24							
American Agile Corp.	Agile Copper		Agile Bronze		Agile Silicon Bronze					
Ampco Metal, Inc.		Phos-Trode			Sil-Trode	Ampco-Trode 10	Ampco-Trode 160	Ampco-Trode 200	Ampco-Trode 250	Ampco-Trode 300
Arcos Corp.		Bronzend P		Nicuend	Bronzend E					
Champion Rivet Co.		Bronze Devil A								
Davies & Son, Inc.		Edco								
Eutectic Welding Alloys Corp.	EutecRod 184	EutecRod 189			EutecRod 182					
General Electric Co.		W-70								
Hobart Bros. Co.				Softcast A						
Lincoln Electric Co.			Aerisweld							
Marquette Mfg. Co., Inc.					61 Bronz-Rod					
Metal & Thermit Corp.		Murex PB-57			Murex SB-80	Murex AB-12	Murex AB-16	Murex AB-20	Murex AB-25	Murex AB-30
Phillips, C. E., & Co.			Crucible Arc 60		Crucible Arc 85					
Reid-Avery Co.		Racolloy Phosphor Bronze				Racolloy Aluminum Bronze				
Universal Welder Corp.		Brazarc P								
Welding Equip. & Supply Co.	Eureka 52	Eureka 50		Eureka 5545						
Wilson Welder & Metals Co., Inc.		235			240	200	216	220	225	230

*Trade name or type number is usually prefixed by company name.
†Refers to AWS "Tentative Specifications for Copper and Copper-Alloy Metal-Arc-Welding Electrodes," No. A5.6-48T.

ANNOUNCING... VICTOR'S NEW, MIDGET SINGLE-STAGE REGULATORS ...7400 SERIES

Designed for users of small acetylene cylinders where hourly gas consumption and space is limited.

7 MODELS TO FIT MANY NEEDS

7401 Acetylene Regulator for shops doing occasional welding and brazing, where equipment cost must be held down. Big enough for all cutting jobs; handles welding nozzles up to size 8.

7402 Carbon Dioxide Regulator. Ideal for drink dispensing apparatus in drug fountains and soft drink stands.

7403 Liquefied Petroleum Gas Regulator for practically any brazing and cutting job of medium capacity in shops using propane or butane.

7404 Oxygen Line Regulator for inlet pressures of approximately 200 psi. Especially good for sit-down production line cutting, welding, brazing, and silver soldering.

7405 Carbon Dioxide Regulator with needle valve; similar to #7402.

7406 Carbon Dioxide Regulator, similar to #7402 and #7405, but has petcock and 60 lb. gauge.

7407 Air Regulator for use with small air compressors, paint sprayers, small air tools, air gas nozzles, etc.

VICTOR'S new Midget Regulators weigh only 1 lb. 12 ozs. Constructed simply . . . any part may be replaced and regulator reassembled in 15 minutes . . . easy to maintain.

Ask your nearest VICTOR distributor to show you how compact, light, and low in cost these new regulators are.

see him NOW

VICTOR
FOR WELDING

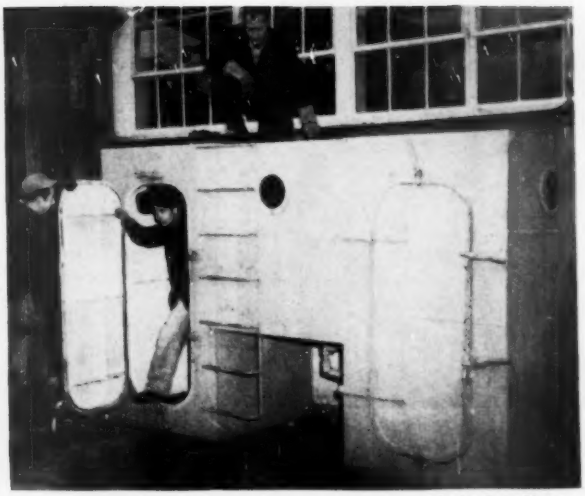
VICTOR EQUIPMENT COMPANY

844 Folsom Street, San Francisco 7, California
3281 Santa Fe Avenue, Los Angeles 11, California
1312 W. Lake Street, Chicago 7, Illinois

on the job

Courtesy Air Reduction Sales Co.

ALUMINUM TANK used for storage of hydrogen peroxide was welded by the inert-gas-shielded process in order to replace a leaky bottom



Pacific Press Photos

DIVING PRESSURES are simulated by pumping air into this welded tank. Weldor reaches into a central compartment to work under water

Maintenance with Inert-Arc

INERT-GAS-SHIELDED arc welding is usually considered to be a production tool. Recently, however, it has branched out into the repair and maintenance field. An example is the replacement of the leaky bottom of a 10½-ft. aluminum tank, 16 ft. long, used for storage of peroxide by the Cannon Manufacturing Co., Kannapolis, N. C.

Using a weaving technique, a single pass was made; this gave complete penetration and provided a slight reinforcement from the outside. One finishing bead was also laid on the inside. With but a single holder, the outside weld was made at an approximate speed of 4 ipm. Inside welding was completed in 1½ hours. Without the time required for cutting out the old bottom, the job of assembly and welding took approximately 15 hours.

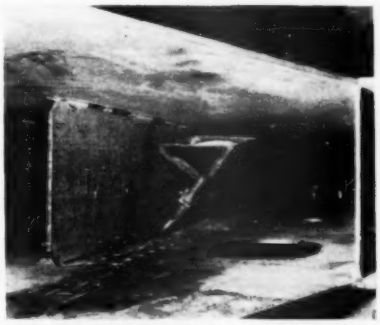
In order to permit the operators to work in the vertical or downhand position, the tank was placed horizontally and set up on rollers. A rope sling was used to rotate it as required.

Though the initial cost of an inert-arc outfit usually precludes its use as an exclusive maintenance tool, possible application to maintenance and repair work should not be overlooked if an inert-arc welder is part of a plant's production equipment.

* * *

Welding in 1-Ft Openings

A 7-FT. nozzle extension carrying a small hopper was used to submerge-melt weld ⅜ by 12-in. diaphragms to ½-in. side plates of deep box support girders for a 60-ton gantry dock crane. After one of the side plates had been welded, the problem faced was to weld inside a large number of openings that were each no more than a foot square and extended for the full width of the girder. It was an almost impossible task to accomplish by means of conventional manual or automatic welding.



Courtesy The Linde Air Products Co.

WIRE IS FED in advance of submerged-melt carriage, enabling welding of inside seam

Solution was to build a pipelike nozzle extension that enabled the welding wire to be projected considerably in advance of the welding head. The latter was mounted on a carriage and traveled in the direction of the weld on a short track that provided a 7-ft. travel. As the carriage approached the girder, its nozzle extension traversed the inside seam to make the weld.

The short track on which the carriage traveled toward the girder was itself mounted on wheels. The whole track could thus be moved along the length of the girder in order to weld the seams within each opening.

* * *

Underwater Welding Class

A CLASS in underwater welding, the first of its kind in a U. S. public school, is now being conducted at the technical division of Santa Monica, Calif., City College. The demand for underwater welders for salvage and underwater pipe-fitting operations is so great that the trade pays $15 and up per hour.

The class uses techniques developed by the navy during the war. The operator stands in an air pressurized tank under actual diving pressures and reaches into a central water compartment wearing rubber gloves and rubber sleeves to his shoulders. The tank was constructed with scrap from blueprints prepared by the Norfolk navy yard. It accommodates two weldors and two helpers at the same time and has glass portholes that permit the instructor, James O'Neill, to observe the job from outside and also permit the operators to look into the water compartment to watch the jobs on which they are working.

In the training technique previously employed, the weldor wore full diving gear and descended underwater to do his welding.

* * *

Broken Tools Silver-Brazed

THOUSANDS of broken tools which would have been junked only a few years ago are today back on the job because of silver brazing. As an example of what can be accomplished with these easily applied alloys, the Silver Users Association, Washington, D. C., cites the case of a broken milling cutter.

The cutter, which weighs about 8 lb., breaks in two along its length. It costs $60, and several weeks may be required before a replacement can be delivered. Conventional welding is out of the question because of heat distortion, but a few cents worth of silver-brazing alloy rapidly puts the cutter back on the job.

The alloy is applied carefully between the broken parts, and the cutter is baked in an oven at 1,175 F. This temperature is quite harmless to the tool but capable of melting the silver alloy so that it runs like water. Capillary attraction pulls the melted alloy into every irregularity of the broken edges.

"Don't Gamble!"

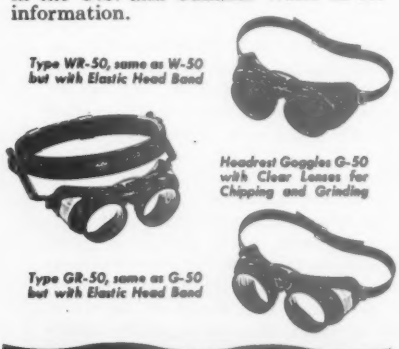
Eye injuries amount to about one-third of industrial accidents. Yet with proper precautions 90% of these can be prevented. All too many seem to be gambling on their good luck—and with disastrous results. Far better to follow the recommendations of safety experts and choose the right protection for each job.

For Gas Welding, Cutting, and Brazing, Jackson Headrest Goggles type W-50 are light and easy to wear, with or without prescription glasses, are simple and easy to adjust, easy to raise and lower.

Goggle assembly is hinged from headrest with telescopic arms, held gently against the face by concealed springs. Spring clips hold arms to headrest to provide added adjustment and easy replacement. Headrest of light, easy to clean plastic, adjustable for size.

Plastic eye cups easily fitted to the face. Outside of each cup has ventilating screen to prevent fogging and baffle plate to keep flying particles and light rays out. 50 mm. glass lenses are available in standard shades from 3 through 6, and have cover glasses to protect them.

Sold only by distributors and dealers in the U.S. and Canada. Write us for information.



Type WR-50, same as W-50 but with Elastic Head Band

Headrest Goggles G-50 with Clear Lenses for Chipping and Grinding

Type GR-50, same as G-50 but with Elastic Head Band

SAFETY GOGGLES · SPECTACLES · EYESHIELDS

JACKSON
PRODUCTS
WARREN · MICHIGAN

QUICK REPAIRS MADE ON HIGH PRESSURE PUMP . . . BRIDGEPORT'S No. 192 LOW FUMING BRONZE ROD

The frame of this high pressure water pump, a part of the hydraulic system for a powerful extrusion press, was quickly repaired by braze-welding with Bridgeport No. 192 Low Fuming Bronze Rod. Quick action with braze-welding put expensive equipment back into production with the minimum delay. To wait for a new casting would have stopped vital production for several weeks.

No. 192 Low Fuming Bronze flows freely, has good tinning action and adheres strongly to parent metal heated only to cherry red. Strong, tough repairs of high tensile strength are made without extensive pre-heating, slow cooling and elaborate set-ups. Precious "down time" and expensive replacements are eliminated.

Learn more about Braze-Welding, the efficient, economical method for maintenance and fabrication of large and small jobs. Have you a copy of Bridgeport's twenty-four page booklet, "Bronze Welding Alloys"? Write for it today.

"Bridgeport" BRASS CO. **BRIDGEPORT BRASS COMPANY**
BRIDGEPORT 2, CONN. • Established 1865

Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

BRONZE WELDING

THE MODERN TOOL OF INDUSTRY

Bronze Welding is widely used: (1) for repairing large and small iron, cast iron, and steel equipment and for building up worn surfaces; (2) for fabricating steel furniture and cabinets; agricultural and industrial equipment; for joining large pipes and duct work; for making silicon bronze tanks, water heaters, and water purifing and waste liquid reclaiming equipment.

Bridgeport Improved No. 192 Low Fuming Manganese Bronze

For gas welding. Melts at approximately 1621° F. Degasified and deoxidized. Produces sound, high strength, tough deposits for repairing heavy duty steel and cast iron machinery and equipment. Equally good for repairing small parts and building up worn surfaces.

Meets Specifications:
Navy 46-R-1 (INT) Grade I, Class A.
Watertown Arsenal WXS-175, Type A.

Bridgeport No. 241 Naval Brass

For gas welding. Melts at approximately 1630° F. Excellent for uniting cast iron and steel parts in general repairing, welding automobile engine blocks, locomotive cylinders, cast iron pipes, etc.

Meets Specifications:
Navy 46-R-1B, Type B; 46-R-1 (INT), Grade I, Class A.
Federal QQ-R-571, Type B.
Watertown Arsenal WXS-175, Type B.

Bridgeport No. 191 Manganese Bronze (Navy)

For gas welding. Melts at approximately 1630° F. Fine for all around uses such as general repairing of cast iron and steel castings, broken gear teeth, pistons, shafts, building up worn surfaces, etc.

Meets Specifications.
Navy 46-R-1 (INT), Grade I, Class A; 46-R-1B, Type A.
Federal QQ-R-571, Type A.
Watertown Arsenal WXS-175, Type A.

Bridgeport No. 632 Silicon Bronze (3% Silicon)

For gas, carbon arc, and metallic arc welding. Melts at approximately 1882° F. Produces dense deposits of high physical properties. For welding silicon bronze, copper, aluminum bronze of low aluminum content, brass and malleable iron. Exceptionally good for carbon arc operations on light gauge steel and galvanized iron.

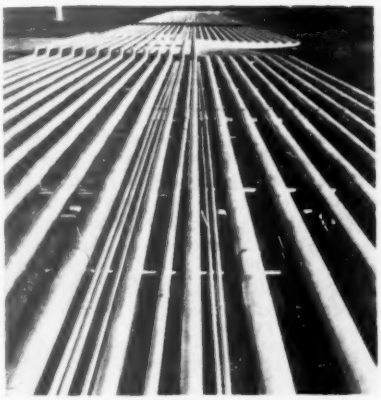
Meets Specifications:
Navy 46-R-1 (INT), Grade II, Class A.
Watertown Arsenal WXS-175, Type G.

Bridgeport No. 609 Silicon Bronze (2% Silicon)

For gas, carbon arc, and metallic arc welding. Melts at approximately 1918° F. Very similar in properties and applications to Bridgeport No. 632.

Meets Specifications:
Navy 46-R-1 (INT), Grade II, Class A.

Bronze Welding Rod A PRODUCT OF **BRIDGEPORT BRASS**



1-IN. PIPE SUPPORTS are suspended by U-clamps under larger diameter 6-in. pipes. Clamps bolt to ears welded on the supports

Small Pipe Carrier

By Elton Sterrett

LINES of 6-in. piping were carried over spans which would be too long for smaller pipes. To keep the small pipes from sagging, causing accumulation or partial stagnation of flow, the weldor for the pipe-line company made up some pipe supports which shortened the spans for the smaller lines without requiring additional foundations or concrete work.

Lengths of 1-in. pipe were cut long enough to bridge the gap between two parallel lines of 6-in. pipe. Each supporting pipe was closed at both ends to avoid internal corrosion and was suspended under the 6-in. pipes by means of U-shaped clamps. The clamp pieces were bolted to ears welded on the 1-in. support pipes.

Laid loosely in the space between the two larger lines, the smaller piping was carried without sags.

* * *

Brush of Flames

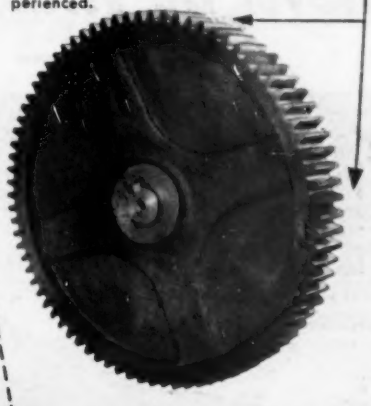
WHEN the Miller Contracting Co. of Ohio received the big job of repainting the hydro-electric dam at Reusens, Va., it was confronted with the problem of removing the old paint from the steel surfaces. It was decided to try oxyacetylene flame-cleaning or flame-priming. The intense heat of the "brush of flames" cockled the old paint, loosened rust and removed surface moisture from the steel—all in a single operation.

Courtesy Air Reduction Sales Co.

FLAME-PRIMING steel bridge to remove old paint and rust prior to repainting

Cast iron tractor yoke welded with TITAN Manganese Bronze.

The broken teeth on this cast iron gear were built up with TITAN Manganese Bronze. No further difficulty was experienced.



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only **BRONZE** offers all of these advantages:

✔ *Can be applied to a wide range of materials*

Mild steel—Cast steel—High and low carbon steel—Wrought iron—Cast iron—Malleable iron castings—Chrome and nickel cast iron—Brass—Bronze—Copper—and many others.

✔ *Easily and quickly applied*

Uniform and easy tinning.
Pre-heating or post-heating for stress relief are not necessary.
Low melting point.
Pre-cleaning can be eliminated with certain types of rods.
Bronze welds are easily machined.

✔ *Bronze welds are dependable in service*

Superior bonding properties.
High strength.
Excellent wear resistance (to reasonably hot or cold pressures).
Corrosion resistant.

TITAN Bronze Welding Rods are double deoxidized by an exclusive patented process to assure ductile, high-strength, non-porous welds. Write for literature today.

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Simply place the jaws over the parts to be welded —and close the toggle lever. This LOCKS the jaws to the work with powerful grip. The parts are held in alignment, securely—freeing both hands for handling the welding equipment. U-shaped jaws provide excellent visibility and working space for welding. Jaws adjust to 1⅝". Made by makers of the famous VISE-GRIP Wrench.

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$2.95

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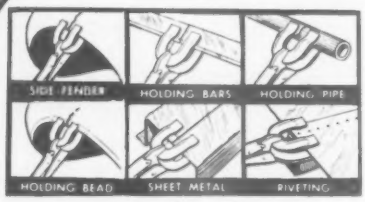
Welding Clamp



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No. 4 FLUXINE, in powder form, for welding cast iron with bronze rods.

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No. 42 FLUXINE used with Westinghouse Phos-Copper rods and low-melting silver solders on copper and its alloys.

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FLUXINE
TRADE MARK REGISTERED U. S. PAT. OFF.

FLUXES TO JOIN ALL METALS

NEW PRODUCTS

(Continued from page 48)

Cast-Iron Electrode

To handle repairs on heavy iron castings, "Eutectrode 24/29," a new ¼-in. electrode, has been put on the market. It is recommended for large turbines, pumps, impellers, mixers, cylinder heads, housings, etc. The same electrode is also available in sizes from 1/32 to 3/16 in. It may be used with either a-c or d-c. EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.

* * *

FILTER lens moves up and down as helmet chin strap is actuated in new welding helmet

Movable Helmet Lens

MOVEMENT of the weldor's chin against a pivoted chin strap lowers and raises the filter lens on the "Blinker" welding helmet. The glass moves up and down inside the helmet by a linkage attached to the chin strap. In applications where both hands are needed, the helmet does away with the necessity of nodding the head and possibly causing the work to shift out of position.

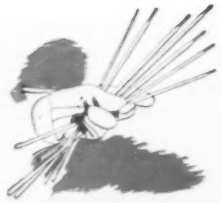
The helmet is said to give protection from side flashes when operator is welding with a group and effective shielding while he is slag chipping. It is made of vulcanized fibre with protective lens in any desired shade. WELDERS' PRODUCTS, Dept. 158, 141 West Jackson Blvd., Chicago 4.

* * *

Stainless Electrode

ESPECIALLY developed to weld "Type 316-ELC" chrome-nickel-moly stainless steel, Champion stainless electrode "316-CF" produces deposits said to match the low carbon content (0.03% max.) of the parent metal. This small amount of carbon (said to be the lowest ever produced in a stainless steel) in both parent and weld metal avoids carbide precipitation and eliminates intergranular corrosion.

The weld metal has a composition of 18.00% chromium, 13.00% nickel, 2.25% molybdenum and 0.03% carbon (max.). As-welded tensile strength is 85-95,000 psi; elongation in 2-in. 40-50%. THE CHAMPION RIVET CO., WELDING DIVISION, Harvard Ave. & East 108th St., Cleveland 5.



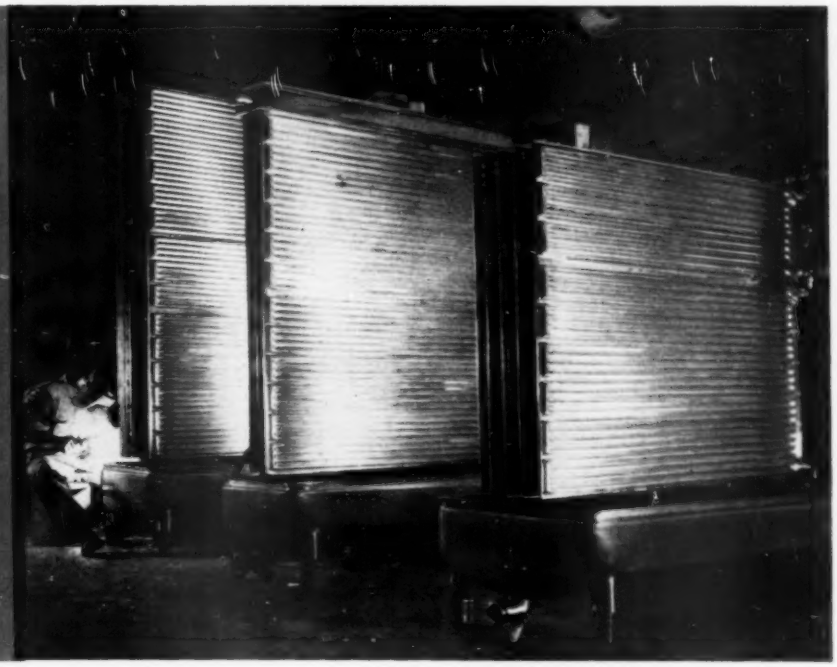
X-ray Quality Stainless Welds —Any Current, Any Position!

SMITHway Certified

AC-DC STAINLESS ELECTRODES

SW-357 • SW-359 SW-362

SOLD BY DISTRIBUTORS EVERYWHERE



SMITHway Stainless Electrodes produce sound, X-ray quality welds, all positions, any current. No undercut at edge of the weld, no porosity after grinding.

These shielded-arc electrodes, certified for uniform quality and characteristics, were specially developed for better welding of stainless steel and stainless alloys. Users gain maximum flexibility of application, plus the economy of a minimum assortment of stocks to meet specific uses and current requirements.

Like all SMITHway Electrodes—made by the originators of modern heavy-coated electrodes and modern welding techniques—they *cut* welding *costs.*

Send the coupon today.

Pays for Itself in Power Savings!

SMITHway AC WELDER

A SMITHway AC Welder installation will more than pay for itself in one year—on the basis of a 2-shift operation—in power savings alone. Improved efficiency under load, plus elimination of idle-time power costs, results in cost savings you can no longer afford to overlook. Send the coupon for all the facts, now!

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Made BY Welders...FOR Welders

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☐ SMITHway AC Welder Bulletins
☐ SMITHway AC Power Savings

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SO ECONOMICAL—it pays to spot several around the shop!

There are plenty of jobs around your shop where handy, low-cost Van Dorn 6" Standard Bench Grinders will save you time and money. With grinding wheels, they sharpen your twist drills, shears, other edging tools—"V-out" joints to be welded—grind down welds. With Van Dorn "Whirlwind" Wire Wheel Brushes, they prepare surfaces for welding by removing rust, scale, old paint—clean up light weld spatter after the job is finished.

When $38.00 buys so much performance, it doesn't pay to continue using slow, laborious hand methods. Order these 6" Standard Bench Grinders today from your nearby Van Dorn Distributor. Write for free, detailed catalog to: The Van Dorn Electric Tool Co., 734 Joppa Road, Towson 4, Maryland.

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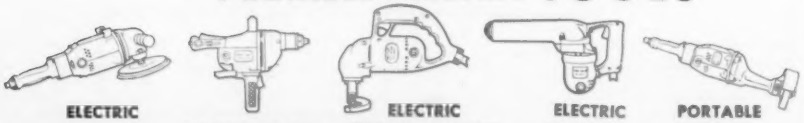
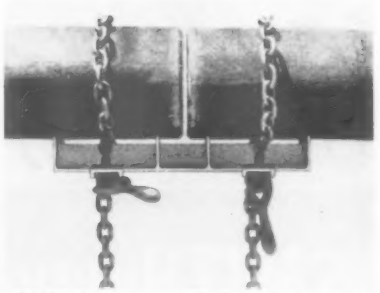


ELECTRIC SANDERS | ELECTRIC DRILLS | ELECTRIC "PORTO-SHEARS" | ELECTRIC HAMMERS | PORTABLE GRINDERS



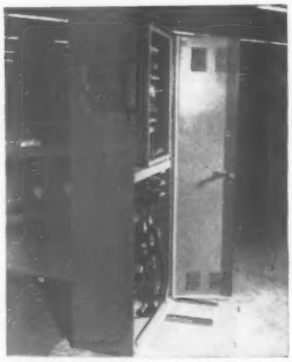
RIGID fit-up for straight lines of piping is maintained with Jewel pipe clamps

Pipe Clamps

For the welded construction of straight lines of piping, mains or risers, Jewel pipe clamps are claimed to save much time by completely eliminating last-minute fit-up—the weldor can devote his full time to welding. Pipe from ½ to 8 in. can be clamped.

Other members of the Jewel line are used for special purposes. The "Tube Turn" clamp lines up welding fittings from 2½ to 8 in. at right angles to pipe and holds them until tacked. There are two models: for either long or short turns. The angle clamp is for use on headers, drips and branches; it will hold a 12-in. branch from a 12-in. header. A flange clamp is also available for pipe sizes from 2½ to 8 in. Handy for use with all these clamps is the Jewel pipe marker for marking a hole and saddle on a pipe up to 8 in. The Jewel Mfg. Co., 1841 University Ave., St. Paul 4, Minn.

* * *



ELECTRODE SPITTING while welding rusty or scaly steel is reduced by new control

Single-Phase R-W Control

Single-phase current is converted to single-phase low-frequency current by a new Westinghouse electronic control of the frequency-converter type. It is said to make possible welding of scaly or rusty steel and can also be used for the welding of brass or aluminum.

The new control operates by passing current in one direction through the primary for four half-cycles and then reversing direction for another four half-cycles, thus producing a low-frequency alternating current on the output side. Complete assembly consists of a sequence panel, frequency-control circuit and weld timer. It may be used only on a resistance welder having a transformer with a center-tapped primary. The Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30.

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

A-C Welding will help!

The typical experience of an eastern manufacturer demonstrates how Westinghouse a-c welding equipment can help you to offset rising operating costs. Using 27 newly-installed Westinghouse a-c machines, this customer enjoys a monthly saving of $810.00 in power costs alone . . . enough to pay for the entire installation in 18 months!

The Westinghouse Flexarc "65" pictured above, has all the features that contribute to this kind of cost slashing performance. Its higher electrical efficiency and lower "no load" losses mean lower power bills. Its lack of moving parts means substantially reduced maintenance expense. Its ability to provide good welds, faster, means fewer man hours and an attractive saving in wages.

Flexarc "65" welders are available in 200, 300, 400 and 500-ampere ratings and operate with an open-circuit secondary voltage of *only 65 volts.* Arc striking is easy and good arc stability is maintained without the addition of troublesome gadgets.

Westinghouse welding engineers are ready to assist you in planning the switch from d-c to a-c or in applying a-c to jobs where you have not before considered welding. But first, get the complete story on the advantages of a-c welding in booklet B-4199. Address: Westinghouse Electric Corporation, P. O. Box 2025, Buffalo 5, N. Y.

J-21506

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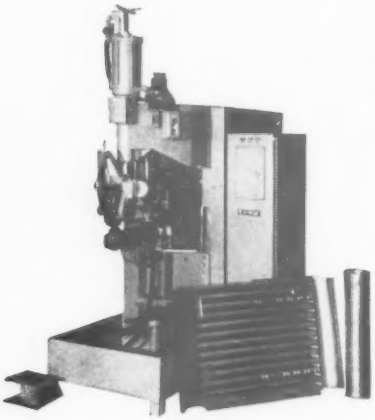
EVERYTHING for Welding ANYTHING!

FLEXARC

6 Cost-Cutting ADVANTAGES

Tri-Phase
TRADEMARK
RESISTANCE WELDERS



1. Greatly reduced power demand.
2. Three phase balanced power load.
3. Desirable high power factor (95%).
4. Improved weldability.
5. Deeper throat depths with essentially no increase in power demand.
6. With Tri-Phase, you can weld low carbon steel, stainless steel, aluminum alloys, magnesium, Monel, Inconel, brass alloys, and other materials on same welder.

THE TAYLOR-WINFIELD CORPORATION
WARREN, OHIO, U. S. A.

TAYLOR-WINFIELD
RESISTANCE WELDERS

OUTPUT varied in new Harnischfeger a-c welders by "saturable reactor" principle

Welder with Saturable Reactor

A NEW line of a-c welders uses a "saturable reactor" for regulating purposes instead of a variable air gap created by a mechanically moving part of the reactor core. The reactor has a separate d-c exciter coil. By varying the d-c (pre) magnetization of the core, different values of a-c resistance (impedance) of the a-c reactor coils are chosen and the output varied accordingly. Special design features insure a current wave-shape and arc-starting characteristic desirable for welding.

The transformer is placed on top of the reactor. The control coils, carrying the d-c control current, are placed around the outside legs of the reactor. The a-c coils, carrying the load current, surround the center leg. An air-gap between center leg and upper cross member of the reactor coil is an important part of the design because it insures the desired wave-shape of the load current; i.e., steep at the zero point instead of hesitating as with a conventional saturable reactor.

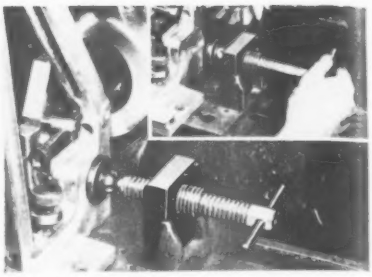
A separate control winding provides voltage (approximately 20 v) to the rectifier and potentiometer (rheostat) of the d-c control circuit. The potentiometers of the smaller industrial machines are removable, and an extension cord allows the regulation of the welder output direct from the working place. The larger heavy-duty models provide a receptacle for the remote control rheostat. HARNISCHFEGER CORP., 4513 West National Ave., Milwaukee 14.

* * *

Work-Holding Units

WORK-HOLDING units for use in jigs and fixtures and for positioning in welding, brazing and machining reduce time required for clamping by eliminating the usual screw action.

Clamping is accomplished in the "Bar-Lok" units through the use of a radially-grooved square pressure bar which slides freely through a threaded collar when turned toward the left (counter-clockwise) against a stop. In this position, the foot of the bar is placed against the work instantly, from a full-open position. The bar is then turned toward the right which brings it into engagement with the threaded collar, thus applying screw pressure against the work.



RADIALLY-grooved square pressure bar slides through threaded collar in new clamp

To release the work, the bar is turned toward the left, releasing the screw pressure and re-entering the free-sliding position, in which it is quickly drawn away from the work.

The "Bar-Lok" units are available in three series, to meet various pressures and length requirements up to 12 in. There is a choice of tee or swivel handles, and of square, round or flexible feet. All parts are made of hardened steel, cadmium-plated. A line of medium duty pressure units in specially adapted C-clamp frames is offered and for application to jigs and fixtures, an internal threaded adapter which may be bolted, welded or brazed into position. MECHANICS ENGINEERING CO., INC., Jackson, Mich.

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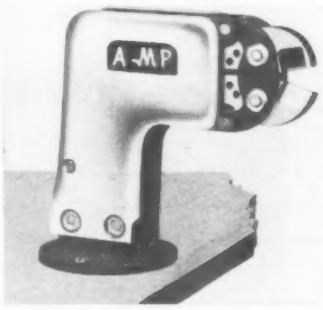

NIBBLING, notching, etc., heads interchangeable on foot-operated bench press

Bench Press

INTERCHANGEABLE cutting heads can be easily removed and inserted on a new foot-operated bench press. Called the "Ampli-Versal" bench press, it has eight heads to perform various indenting, knock-out, nibbling, notching and blanking operations.

The press comes with one cutting head, foot pedal and adjustable pedal rod. AIRCRAFT MARINE PRODUCTS, INC., 1689 North Fourth St., Harrisburgh, Pa.

* * *

Metal Cleaner

PAINT, sludge and light carbon can be removed from automotive and aircraft engines and parts by a new metal cleaner, "Kelite Formula 504," claimed not to damage metal, even cadmium and zinc. The fluid has a low evaporation rate and does not burn up to a temperature of 140 F. KELITE PRODUCTS, INC., Box 2917, Terminal Annex, Los Angeles 54.

Arc-welding Accessories

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INCREASED PROTECTION

BETTER WELDING

LONGER LIFE

FOR INERT-ARC WELDING

FOR ATOMIC-HYDROGEN WELDING; 99.9% PURE

General Electric tungsten electrodes, for Inert-Arc and atomic-hydrogen welding, assure you quality of content, plus precision finish. They are now available for manual and automatic welding in diameters ranging from .040 to ½ inch and in lengths of from 3 to 24 inches as standard. Random lengths up to 60 inches furnished on request.

For more detailed information, see your local G-E Arc-welding Distributor, or fill out the coupon and mail it today. We will send you a copy of the easy-reference G-E Arc-welding Accessory Catalog.

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GENERAL ELECTRIC, Section A 711-2
Apparatus Dept., Schenectady 5, N.Y.

Please send me, without obligation, G-E Arc-welding Accessory Catalog GEC-253.

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USE THE NEW

FLUX-POT for FAST EFFICIENT FLUX HANDLING

Unit complete with 6-ft. rubber cord and plug.

Fully automatic thermostat control set to keep flux at constant 180° temperature.

This pot provides a low-cost labor and material saving means of handling flux for Industrial Silver Brazing. ECONOMICAL . . . will pay its original cost in a short time by increasing brazing efficiency and output. Enables the user to extend volume of usable flux by 20% water dilution with practically no splash loss. GET DETAILS NOW!

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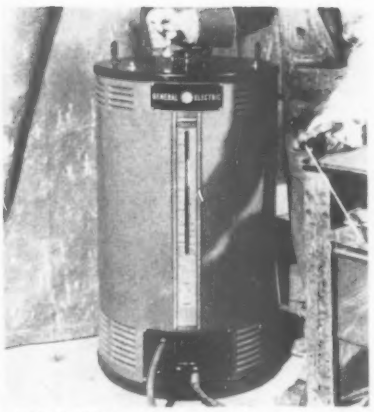
Kansas City 2, Mo. • 227 Werby Bldg., 39th & Main Sts.



STRONGER housings, greater current range featured on new line of a-c welders

A-C Welders

INCREASED welding range and stepless precision current control feature a new line of G-E welders. These a-c welders are available in 200, 300, 400, and 500 amp models for indoor manual welding and in 750 and 1,000 amp models for machine and submerged-melt welding. The 300, 400 and 500 amp models are also offered in weather-resistant enclosures for outdoor work. Finally, there is a special 200-amp model for light-duty welding.

A dual-current range provides extra low current or high maximum short-time output. The welders have an open-circuit voltage of 75 volts. The "Idlematic" control on the weather-resistant models automatically reduces the open-circuit voltage on the electrode to about 30 volts but retains the advantage of the higher open-circuit voltage when the arc is struck. GENERAL ELECTRIC CO., WELDING DIVISION, Schenectady 5, N. Y.

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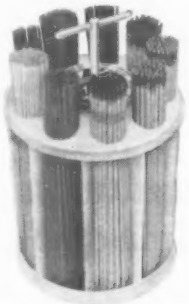
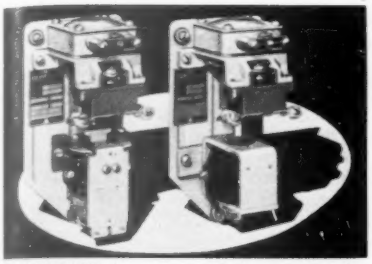


"ROD-HOD" electrode carrier contains 30 lb of various electrodes. Protects coatings, clothing and identifies different types

Electrode Carrier

MARQUETTE "Rod-Hod," handy carrier for electrodes, provides positive identification of various types, protects electrode coatings, and saves wear and tear on weldor's pockets. It holds more than 30 lb. of electrodes in 16 sizes and types, including this manufacturer's No. 130 "Red-Rod," No. 140 "Production-Rod," No. 40 "Blue-Rod," No. 85 "Hy-Test-Rod," No. 100 "Hard-Rod," No. 550 "Hard-Rod," No. 650 "Tool-Rod" and No. 44 "Nicol-Rod." When empty, the carrier may be refilled with Marquette "Rod-Paks" in 1 and 5 lb sizes. MARQUETTE MFG. CO., INC., 307 East Hennepin Ave., Minneapolis 14, Minn.

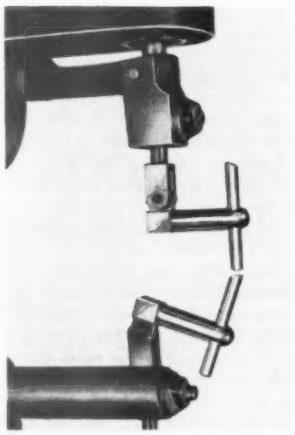


ACCURATE timing is provided over a period variable from 0.2 seconds to 3 minutes

D-C Pneumatic Timer

ELECTRICAL interlocks on a new d-c pneumatic timer are operated by the magnet which actuates the switching mechanism, avoiding the need for additional switching relays. The timer may be used in various applications of resistance welding and machine sequencing. Timing is accurate to within plus or minus 10% variation from the mean timing period. Range is adjustable from 0.2 seconds to 3 minutes with a fingertip setting of knurled knob or micrometer dial. Timers are available arranged for time delay after either energization or de-energization of the magnet. SQUARE D. Co., 4041 North Richards St., Milwaukee 12.

* * *



FULL 180-DEG range of head adjustment possible on new Mallory R-W electrode holder

R-W Electrode Holder

DESIGNED to save setting-up time and eliminate the need for bending and machining special tips, a new Mallory electrode holder for bench type resistance welders has a full 180 deg range of head adjustment. The head may be locked in any position under full operating pressures.

Heads are available for 30 or 90 deg electrode angle and the electrodes have positive, non-slip adjustment in the holder head over their entire length of 1¾ in. Because each electrode has a 90 and 30 deg welding face, in combination with 90 and 30 deg holder heads, a variety of positions is possible.

The new holders eliminate the need of handling rod stock for making up special electrodes. Electrodes are available in "Elkaloy A" and "Mallory 3" metal and are packaged in 1/16, ⅛ and 3/16 in. diameters. P. R. MALLORY & Co., INC., Indianapolis, Ind.

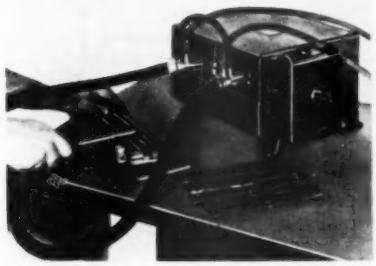
STICKS, PELLETS and lacquer for temperature indication are now available in 12½-F intervals over a range from 113 F to 400 F

Temperature Indicators

ADDITIONAL temperature ratings have been announced by Tempil Corp. For the first time, Tempilstiks, Tempilaq and Tempil Pellets are available in 12½-F intervals over a range of from 113 to 400 F.

Increments of 50 F can be obtained over 400 to 1,600 F with Tempilstiks and Tempilaq. The pellets are available in ratings up to 1,700 F. TEMPIL CORP., 132 West 22nd St., New York City 11.

* * *



BRUSHING the work with the electrode joins parts in new "sputter welder"

Sputter Welder

FOR use as a preparatory tool in soldering operations a new "sputter welder" tacks light metal parts together. This is carried out by a "spark sputtering" action and is useful on thin hollow articles such as nickel silver, low carbon, stainless steel and brass knives, forks, comb or mirror handles. Parts to be welded are joined by gently brushing the work with the electrodes.

The welder consists of a transformer with five secondary taps for various thicknesses and types of material. Current from the transformer is conducted through water cooled copper cables. The cable containing the terminal lug is fastened to a locating fixture for the workpiece. The other cable with the welding electrode can be adjusted to the secondary tap as needed. A rheostat is supplied for fine heat adjustment between secondary taps.

Welders come in ½ to 3 kva capacities and are mounted in electrically grounded steel cases. Eisler Engineering Co., 750 South 13th St., Newark 3, N. J.

The

KENT

SUCTION CLEANER

for

FLUX RECOVERY

Pays for itself by salvaging valuable flux!

This compact, easily portable machine can be adapted to any type of welding application.

The KENT SUCTION CLEANER

The Kent Suction for Flux Recovery picks up the unfused flux and small fused particles from the weld. The fused particles are automatically screened out of the flux and the fine dust is removed—clean flux is then deposited in the lower tank ready to be returned to the automatic welder as needed.

For literature and prices write to:

THE KENT COMPANY, INC.

436 Canal St. • Rome, New York

Representatives in Principal Cities

News of the Industry

Liquid Carbonic Buys Eastern Oxygen Firm

LIQUID CARBONIC CORP., Chicago, has purchased the Paschall Oxygen Co., Philadelphia. It will be operated as the Paschall Oxygen Division of Liquid Carbonic.

F. H. Lewis, sales manager of Liquid Carbonic's Wall Chemicals Division, will supervise operations of the new division. John J. Dunne, who has been sales manager of Paschall, has been appointed branch manager. The operating personnel of Paschall will remain unchanged.

* * *

Big Welded Dipper Boosts Coal Production

BIGGEST dipper ever made is one of 55 cubic yard capacity, fabricated recently by Lukenweld division of Lukens Steel Co., Coatesville, Pa. Designed by Lukens development engineers in collaboration with those of the Hanna division, Pittsburgh Consolidation Coal Co., the big dipper will be used near Adena, O., to strip "overburden," the soil covering veins of bituminous coal. The rate of stripping with this new giant scoop is expected to be about 20% greater than ever before attained in the southeastern Ohio soft coal fields.

The dipper was made by welding together manganese-molybdenum and austenitic steel plates from one to three inches thick. Fully 90% of the plates have tensile strengths on the order of 110,000 psi. The bucket of the dipper measures approximately 11 by 13 by 12 ft. Used with a 54-ft boom mounted on a caterpillar-type chassis, the dipper can cut a swath 80 ft deep by 90 ft wide, without moving the rig.

Weldor Clothing Maker Moves to New Address

ALJAY MFG. CO., Inc., maker of protective leather clothing for weldors, has moved from 1230 Vine St., Philadelphia, to new and large quarters at 1516 Callowhill St., Philadelphia 30.

* * *

Acetylene Plant Opened By Linde in Southwest

A NEW acetylene plant built by the Linde Air Products Co. has commenced production in Albuquerque, New Mexico. It will supplement the facilities of an oxygen plant owned by Linde which has operated there for about seven years. A warehouse is also located at the plant address, which is at 2520 South Second St., P. O. Box 805.

* * *

Welding Lens Manufacturer Moves Factory

AMERICAN INDUSTRIAL SAFETY EQUIPMENT CO. has moved to a new factory at 847 Lexington Ave., Brooklyn 21, N. Y. The company operates as a division of Burdett Oxygen Co., Cleveland, manufacturing safety goggles, lenses, helmets, face shields and respirators.

* * *

Illinois U. Dedicates Engineering Building

A new $2,000,000 electrical engineering building will be dedicated May 19-21st at the University of Illinois, Urbana, Ill. The building has large classrooms and laboratories for experimental work in communications, illumination, measurements, servomechanisms and electrical machines.

Cleveland AWS Section To Hold Symposium

THE Tenth Annual Symposium of the Cleveland Section of the American Welding Society will be held at the Statler Hotel, Friday, May 13.

Speakers on gas, arc and resistance welding subjects will be presented in the afternoon. The dinner speaker is "Dusty" Miller, of Wilmington, O. Reservations for the dinner are $4.50 each and may be obtained from Ed Scott of Scott-Tarbell Co., 2261 East 14th St., Cleveland 15.

* * *

Trailer Mounted Welders Repair Power Poles

WHEN high-tension poles corroded along seven miles of rough terrain on the New York, New Haven and Hartford Railroad's electrified trunk line between Stamford and New Canaan, Conn., the big problem confronting the contractor was how to bring welding equipment to the nearly inaccessible defective poles.

The electrical contractor, Hallen Co. of Long Island City, N. Y., devised a special rig that included a jeep to pull a trailer on which two engine-driven welders were mounted.

Three coordinated steps had to be taken to get the job done. First, a representative of the railroad's signal department went over the route, detached the ground bonds from the poles and replaced them with jumpers to the tracks. This removed the danger of electrocuting the weldors. Secondly, the concrete was broken away around the bases of the poles to expose the corroded parts. Finally, the weldors followed to weld steel supports around the webs of the poles. The welder trailer was located so as to permit work to be done simultaneously on two poles.

Extension cables from 200 to 300 ft long were necessary because the trailer could not be brought right next to the poles. Very rarely, however, was the crew unable to come close enough to the poles to reach them with the extension cable. In one such instance, on swampy ground, the trailer could not approach within 300 feet of the pole so the welders were lifted onto a pushcart and hauled by hand to the work.

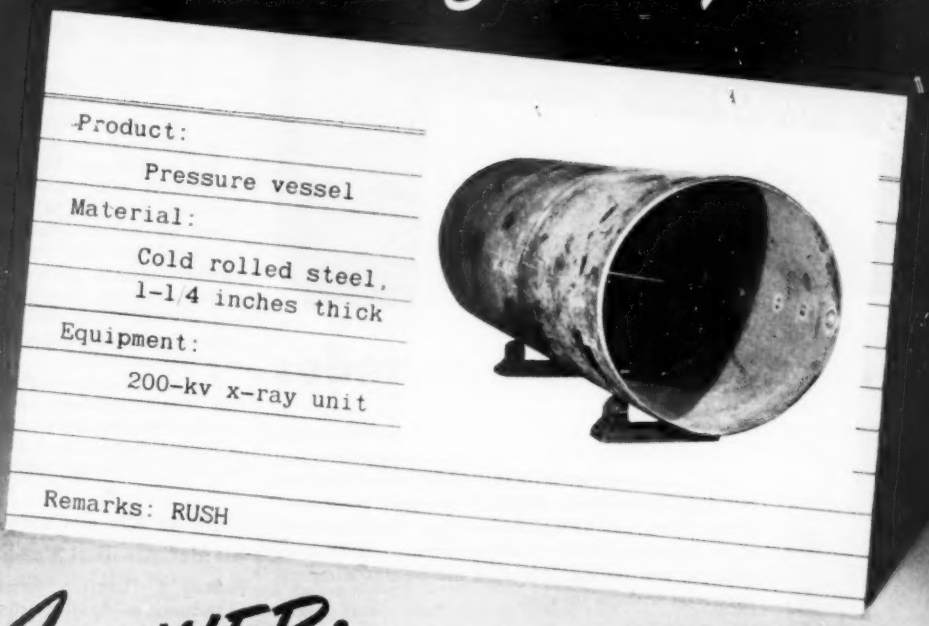
Courtesy Lukens Steel Co.

BIGGEST dipper on earth can strip 55 yd of overburden in surface coal mining operations. It is arc-welded of manganese and austenitic steel plates, measures 11 by 13 by 12 ft. It was built by Lukenweld

Courtesy General Electric Co.

ROUGH terrain along railroad right-of-way complicated repair of corroded power poles. Two welders mounted on a jeep-pulled trailer did the job. 200 ft extension cables were necessary at some spots

What's the right X-Ray film?

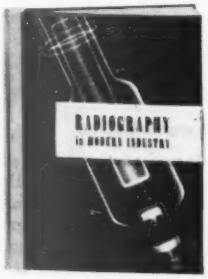


ANSWER:

KODAK INDUSTRIAL X-RAY FILM, TYPE K

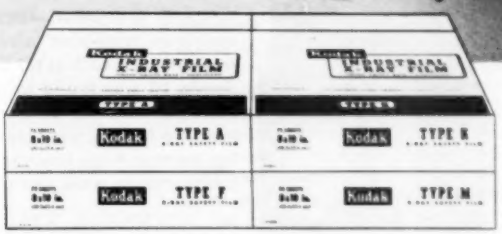
The wall of the tank was thick—the kilovoltage available was low. And the customer was impatient for delivery. So the radiographer did this job with Kodak Industrial X-ray Film, Type K.

This film, in contact with lead foil screens, has sufficiently high speed to allow reasonable exposure with equipment of moderate power. The good definition so obtained is added assurance that significant weld irregularities will not be missed.



RADIOGRAPHY IN MODERN INDUSTRY

A wealth of invaluable data on radiographic principles, practice, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get your copy from your local x-ray dealer—price $3.00.



A TYPE OF FILM FOR EVERY PROBLEM

To provide the recording medium best suited to any combination of radiographic factors, Kodak produces four types of industrial x-ray film. They furnish the means to check welds efficiently and thus extend the use of the welding process.

Type K has medium contrast with high speed. For gamma ray and x-ray work where highest possible speed is needed at available kilovoltage without calcium tungstate screens.

Type F provides the highest available speed and contrast when exposed with calcium tungstate intensifying screens. Has wide latitude with either x-rays or gamma rays, exposed directly or with lead screens.

Type M provides maximum radiographic sensitivity, high contrast, and exceptional detail under direct exposure or with lead foil screens. It has extra fine grain and the speed is adequate for examination of light alloys at moderate kilovoltage and for much million-volt radiography.

Type A offers high contrast with about three times the speed of Type M, but with slightly more graininess. Used direct or with lead foil screens for study of light alloys at low voltages, and of heavy steel parts at 1000 kv.

Radiography...

another important function of photography

EASTMAN KODAK COMPANY
X-ray Division · Rochester 4, N. Y.

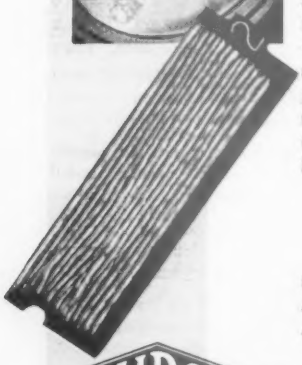
"Kodak" is a trade-mark

Kodak

. . . use Ampco electrodes

PRODUCTION WELDING—Ampco's "Phos-trode was selected for the fabrication of these bronze water-heater tanks after exhaustive tests of other rods and welding techniques. With Phos-trode electrodes, there was no deposit and fusion-zone cracking. Minimum spatter reduced cleaning time; freedom from porosity and pitting. All tanks met hydrostatic pressure tests without trouble.

REPAIR WELDING—Brazing, and welding with a variety of "cast-iron" electrodes were tested for repairs on parts such as the flywheel illustrated. Ampco-Trode 10 was found to be easier on the operator, more economical—and besides it produced a better job. Pre-heating was held down to 250° F.; low welding currents kept base-metal dilution to a minimum; and the dense weld was machined without difficulty.



MAINTENANCE WELDING—Ampco-Trode 200 overlays on railroad roller-bearing shoes extend service-life many thousands of miles. For instance, Number 2 Binders, the most severe wear location, on locomotive shoes, last 80,000 miles (compared to 40,000 miles in phosphor bronze.) Shoes in 1, 3, and 4 locations operate 300,000 miles between shoppings. And this extra service is gained by a 5/16" two-layer overlay on new shoes (3½ hours welding time) and ¼" one-layer overlays on worn shoes (2 hours welding time).

You can make similar savings!

Cut costs on your production, repair, and maintenance jobs with Ampco electrodes. Keep a supply of Ampco electrodes on hand at all times. Call your Ampco distributor for his recommendations today!

AMPCO®

AMPCO METAL, INC.
MILWAUKEE 4, WISCONSIN
West of the Rockies, it's the Ampco West Coast Plant, Burbank, Calif.

FREE—Money-saving information on Ampco Welding Electrodes

Tear out this coupon and mail today!

AMPCO METAL, INC., Dept. WE-5, Milwaukee 4, Wis.

Send me complete information on Ampco-Trode, Phos-Trode, and other Ampco arc-welding electrodes.

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Company.....
Address.....
City.....(.....) State.....

W-108

International Welding Institute To Hold Meeting May 16-20

SECOND meeting of the International Welding Institute will be held in Delft, Holland, May 16-20. Chairmen of commissions for gas, arc and resistance welding, documentation, testing, welding dictionary, safety, weldability, residual stresses, stress relieving and brittle fractures will make reports on work so far done and programs to be undertaken.

The institute was formed in May, 1948, at Brussels with representatives from 14 countries present. A constitution was drawn up and a council appointed consisting of three representatives from each member country. From the council, a president, three vice-presidents, treasurer and secretary were chosen, each of these honorary positions being held by nationals of a different country.

The initial work of the institute is to find out what research is being done in the various countries and to avoid overlapping. A further purpose is to encourage greater worldwide use of the welding processes.

* * *

Duffield Given Charge of McGraw-Hill Publications

EUGENE S. DUFFIELD, formerly in charge of domestic publication activities, has been appointed senior vice-president of the newly formed Publications Division of the McGraw-Hill Publishing Co., Inc., New York City, publisher of THE WELDING ENGINEER.

The new division covers all domestic magazine and catalog publishing activities, together with related publishing services.

* * *

Milwaukee R-W Firm Changes Hands

DAVID V. UIHLEIN has purchased the Banner Mfg. Co., 4960 North 29th St., Milwaukee 9, and will act as executive director. Formerly known as Banner Products Co., the firm manufactures resistance welders and resistance-brazing machines.

Design changes in the models now being manufactured and improved distribution and service organizations are being developed. In addition a new line of welding products will be produced.

J. R. G. Harris handles the sale of Banner welders in Wisconsin. Arthur Kranitz is in charge of production. The company's technical staff is being augmented.

* * *

Delta Welders Introduced at Six West Coast Cities

THE new Delta line of spot, arc and combination welders manufactured by Delta Mfg. Div., Rockwell Mfg. Co., Milwaukee, was shown to dealers and customers in six demonstrations in west coast cities during March and April. Robert E. Zahn of the engineering department conducted the demonstrations.

Dealers and customers were invited to ask questions, operate all three types of machine and weld samples of work. Cities visited were San Diego, Los Angeles, San Francisco, Portland, Seattle and Vancouver, B. C.

HOBART electrodes

give stronger, neater welds . . . *faster!*

"No. 12 Hobart Electrodes pay for themselves in cleaning time saved."

That's how a nationally known manufacturer of road machinery expressed 100% satisfaction with the characteristics of Hobart No. 12 electrodes. Other users tell of increased speed, easier handling, lack of spatter, quiet arc, uniform bead, good machinability, superior performance in all positions with higher than normal welding currents. Satisfy yourself. Write for samples of this non-premium electrode and compare. Made in all standard sizes for A. C. and D. C. welding.

The HOBART accessory line . . . one of the industry's most complete.

Everything needed to protect the operator and increase his efficiency is available in this fine quality line. Each item must pass the same high standards established for Hobart Arc Welders. Use coupon for information.

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HOBART

"One of the w... ...'s largest builders of arc welders"

Arc Welders Catalog Interesting data on complete AC and DC line.

Accessories Catalog Hundreds of items to fill your needs.

Electrode Catalog Specs., and sizes on complete range of electrodes.

CLIP COUPON AND MAIL TODAY

HOBART BROS. CO., Box U-591, TROY, OHIO

Please send data on items checked:

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Our work is_____

free

Mail coupon for this "Guide to Better Welding."

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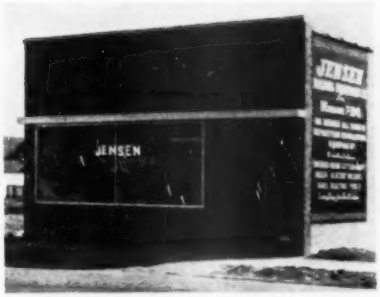


EXTERIOR of new plant of Jensen Welding Equipment Co., Chicago. Custom regulator repair is handled by four repairmen

Regulator Repair Shop Moves to Larger Building

JENSEN WELDING EQUIPMENT CO., INC., firm specializing in the repair and rebuilding of gas welding and cutting equipment, held an open house on March 19 in its new building at 5037 West Diversey, Chicago. The building is a $30,000 brick structure measuring 25 by 110 ft.

More than 180 guests were welcomed to the shop during the day. J. L. Jensen, president of the firm, and his staff of four repairmen were in the shop to act as hosts and guides around the building. The shop foreman, Ozzie Hay, demonstrated his work on hospital gauge equipment, a specialty service offered.

Welders, welding equipment and welding accessories were prominently displayed in the front showroom and offices.

Major business of the shop is the repair of compressed gas gauges and gas torches for welding shops, gauge manufacturers, soda fountains, hospitals and factories. The sale of welding equipment is handled by two salesmen, Burt Wieland and R. J. Jensen, vice-president.

* * *

Spanish Welding Institute Sponsors Varied Activities

THE Welding Institute, Goya 58, Madrid, Spain, will soon announce prizes for the first competition of welding papers written in Spain which closed last Jan. 1. The Institute plans a second contest this year.

The Institute holds a national assembly in Madrid every year. The director of the institute, Francisco Bustelo, has also announced that the library of textbooks and periodicals on welding subjects is also open to all interested.

—McGraw-Hill World News

* * *

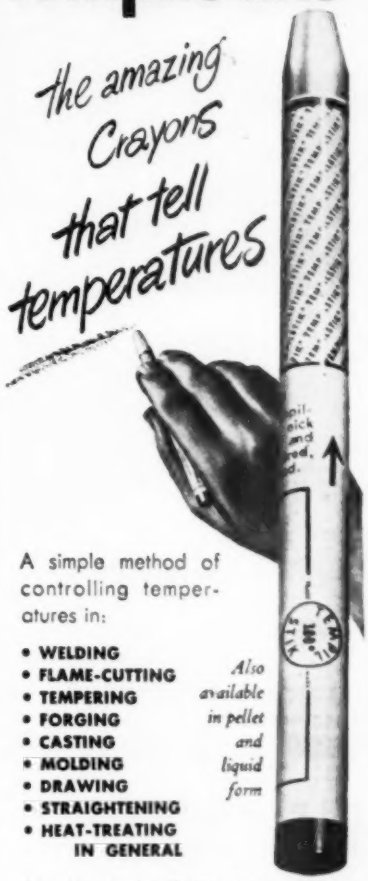
Carnegie Tech to Build And Renovate on Campus

A $4,900,000 program for construction and rebuilding on its campus has been announced by Carnegie Institute of Technology at Pittsburgh. A million dollar wing will be added to Engineering Hall. A power plant and steam and electricity distributing system will cost another million dollars.

In its renovating, the school will build new stories within present buildings, redesign space between upper floors and roofs for laboratory, office and classroom use and re-assign space.

Tempilstiks°

the amazing Crayons that tell temperatures



A simple method of controlling temperatures in:

- **WELDING**
- **FLAME-CUTTING**
- **TEMPERING**
- **FORGING**
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- **MOLDING**
- **DRAWING**
- **STRAIGHTENING**
- **HEAT-TREATING IN GENERAL**

Also available in pellet and liquid form

It's this simple: Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 each gives up to 2000 readings

Available in these temperatures (F)			
125	275	500	1100
138	288	550	1150
150	300	600	1200
163	313	650	1250
175	325	700	1300
188	338	750	1350
200	350	800	1400
213	363	850	1450
225	375	900	1500
238	388	950	1550
250	400	1000	1600
263	450	1050	

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

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We invite inquiries from reputable distributors interested in handling **Tempil°** *Products.*

In coverspecs or regular models. For chippers and grinders as well as welders.

Eyegard "Champions" have 10-way ventilation!

Eyegard "Champions" are easier on the eyes . . . help your men to work steadier with less "time out." There's extra comfort in them because the superlight plastic is molded to form fit the face . . . extra protection because the goggles are impact-resisting . . . extra ventilation through three large vents at side of cup and seven additional vents around the lenses. Cool and fog-free. With all these superior features, they cost you no more than ordinary goggles. Next time you order—get Eyegard "Champions!"

Write for free catalog of Eyegard Equipment . . . It will save you money.

AMERICAN INDUSTRIAL SAFETY EQUIPMENT COMPANY

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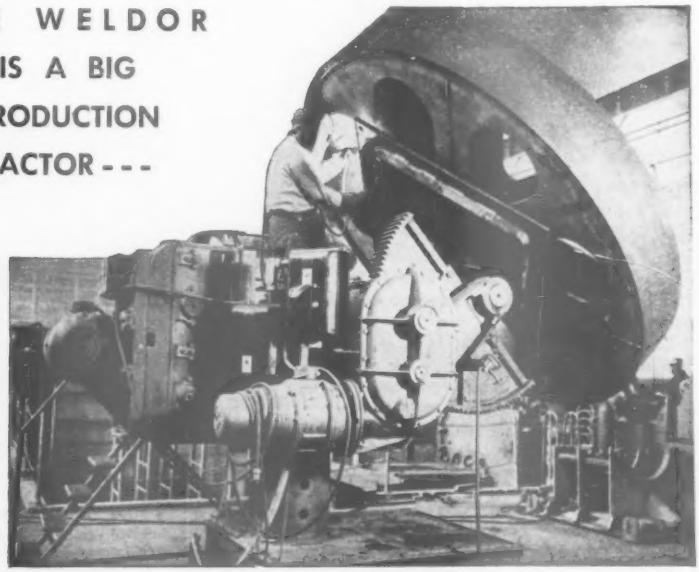
DIVISION OF THE BURDETT OXYGEN COMPANY · CLEVELAND, OHIO

THE WELDOR IS A BIG PRODUCTION FACTOR - - -



Your weldors are big production factors when they work with C-F Welding Positioners because these power operated Positioners with variable speed table rotation are real production tools. Better automatic welding is possible because the C-F Variable Speed feature governs table rotation speed from 0 r.p.m. and up—assuring better control of fillet in circular or peripheral automatic welding.

If increased production, better downhand welding and lower costs in your welding department can help you meet the competition for new markets, C-F hand and/or power operating welding positioners should be your first choice. Write for Bulletin WP 24.

CULLEN-FRIESTEDT CO.

1309 S. KILBOURN AVENUE CHICAGO 23, ILL.

1,600 People Attend Omaha Welding Confab

More than 1,600 people from nine Midwestern states attended the Eleventh Annual Welding Confab of the Omaha Welding Co., Omaha, Nebr., on March 29-31. Pronounced the most successful "Confab" so far, it offered three days filled with demonstrations of various welding techniques, new equipment lectures and movies on welding and related processes.

Representatives from 24 manufacturers demonstrated their products in operation on actual welding jobs. Such unusual tasks as welding a die cast radiator, hardfacing of plowshares and grinding of small welds were illustrated so that the confab guest could duplicate such jobs in his own shop. Factory men also gave a two hour lecture session each day on pertinent information relating to their company products.

Some visitors traveled more than 1,000 miles to attend the conference. Many guests sought advice on knotty maintenance problems.

* * *

Railway Appliances Show Held in Chicago

More than 5,000 railroad and railroad supply men attended the Thirty-Fourth Exhibition of the National Railway Appliances Association held at the Chicago Coliseum March 14-17.

Among all types of machines for maintaining rails, roadbed, and switches, welders and welding equipment were prominently displayed. Exhibitors in the welding field included Air Reduction Sales Co.; Cullen-Friestedt Co.; Harnischfeger Corp.; The Hobart Brothers Co.; Nelson Stud Welding Div., Morton Gregory Corp.; D. W. Onan & Sons, Inc.; The Oxweld Railroad Service Co. and Teleweld, Inc.

* * *

Powder-Cutting Process Replaces Oxygen Lancing

Instead of the oxygen lance, the Jones & Laughlin Pittsburgh Works employs the powder-cutting process to reduce heavy scrap such as skulls, buttons and spills to charging-box sizes. Notable savings in time and money are said to have been effected. An average of 1,000 tons of metal are cut up each month to suitable sizes for the open-hearth furnace.

The button-cutting crew consists of a torch operator, a helper and a repair man. A spill which previously required 30 days to dismember with the oxygen lance can be powder-cut to charging size in two working days.

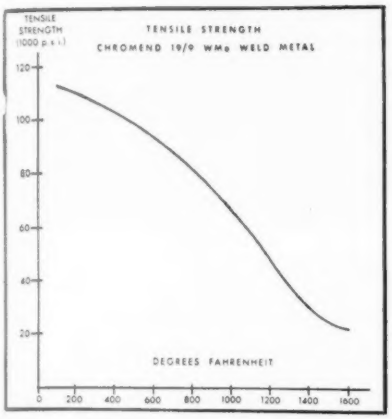
* * *

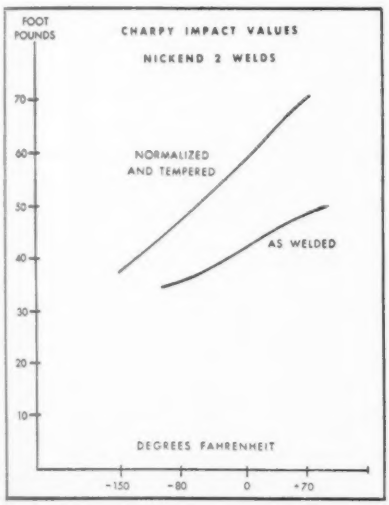
Welded Scavenger Boat For New York Harbor

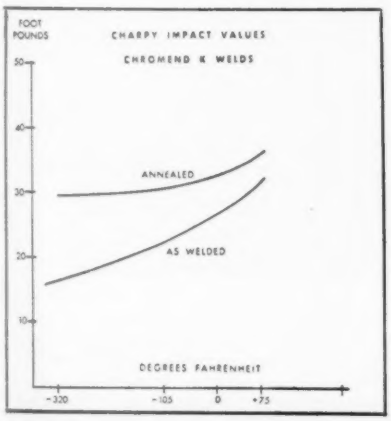
Built to pick or "scavenge" loose debris and driftwood floating about New York Harbor, the *Driftmaster* is a 250-ton, 100-ft. long vessel having double pontoon-like hull 36 feet wide. It is Diesel-powered with twin screws and is equipped with chain nets for collecting debris and a 12½ ton boom. The *Driftmaster* is a 100% welded vessel, according to word received from The Lincoln Electric Co., Cleveland.

HIGH 2000°f

LOW 320°f







MANY YEARS AGO Arcos was asked to develop electrodes to give weld metal to withstand temperatures in the 1800°-2000° F range. Arcos did it.

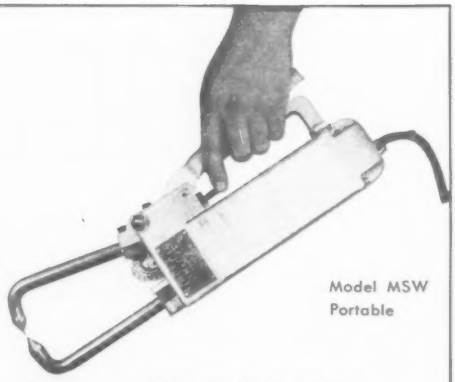
Recently Arcos was asked to develop electrodes to give weld metal to meet service requirements at temperatures in the sub-zero range. Arcos did it.

These achievements reflect the ability and competence which produces electrodes to give the very highest quality weld metal for any kind of service conditions.

Consistently good welds are obtained when Arcos electrodes supply the weld metal.

ELECTRODES • COILED WIRE • BARE ROD

USE
miller
SPOT
WELDERS



Model MSW
Portable

Portable • Stationary
Model MPS-10-FT

FOR . . . EASIER "SPOTS"
FASTER "SPOTS"
EXTRA PROFITS

"Solve your spot welding problems the easy, economical MILLER way—for "spots" on clean stainless or mild steel up to 1/8" combined thickness with the job-proven, portable Model MSW—for heavier metal with the *NEW* manually-operated, portable or stationary 10 KVA Models or, the *NEW* air or manually operated portable or stationary 20 KVA Models. They're all quality-built, factory-tested by MILLER. See them at your Miller Distributor's or write for complete details."

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APPLETON, WISCONSIN

"Sold Only through Recognized Distributors"

SAVE!
TIME AND
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SPEEDY LAYOUT JOBS
ON PIPE AND
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NOW! NEW EASE AND SPEED
WITH THE
CONTOUR MARKER

Compact, fits into hip pocket. Efficient, accurate, easy to use. Any of the angles in the illustration to the right can be marked off in five minutes or less on any pipe from 1½ to 18 inches. Saves time, labor and gas—will pay for itself in one day.

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STREET .....
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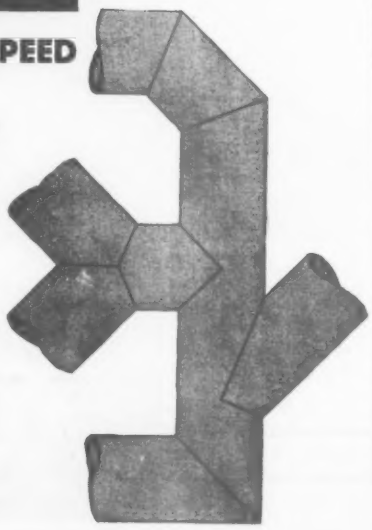

Courtesy General Electric Co.
WELDING chrome piping at Houston. Note asbestos tape for slow cool from postheat

New Technique Developed for Welding Chrome Pipe

A new procedure for welding 4-6 chrome piping was announced recently by Houston Pipe & Steel, Inc., of Houston, Tex. The process was devised to facilitate the installation of piping in a large Texas oil refinery.

Details are given by M. Van Blaircom, chief engineer of Houston Pipe and Steel. The welding was done with a 4-6% chromium electrode (ASTM-AWS Spec. No. E-502) of the same composition as the parent metal. Temperature of the prepared joint was brought up to 600-800 F. with a large preheating tip on an oxyacetylene torch and kept at that level while the weld was made. After welding, the temperature of the joint was raised to 1,200-1,350 F., and the pipe was wrapped with asbestos tape to a minimum thickness of 1 in. while it slow-cooled to room temperature.

Contrary to popular belief, this technique did not make the weld metal so hard that it became brittle, stated Mr. Van Blaircom. Laboratory tests showed an ultimate tensile strength of 73,200 psi and a satisfactory rating on a 180-deg. root bend. Brinell hardness in the weld was 248, Brinell hardness in the pipe 174. Chemical analysis of the weld metal showed 7.73% chromium in the weld and 4.53% chromium in the pipe.

Where greater ductility and elongation were required, a furnace anneal at 1,600 F. was given after the pipe had cooled. This resulted in an average elongation of 40% in 2 in.

* * *

Cost-Saving Hints Published by Lincoln

An 8-page rotogravure news sheet is being distributed to factory personnel by Lincoln Electric Co., Cleveland, to act as a "thought-starter" on ways to cut operating and production costs by arc welding. It is aimed at the cost-conscious plant superintendent, plant engineer, master mechanic, methods engineer and maintenance engineer and shows photographs and drawings of how plants all over the country are using arc welding for maintenance, construction and production.

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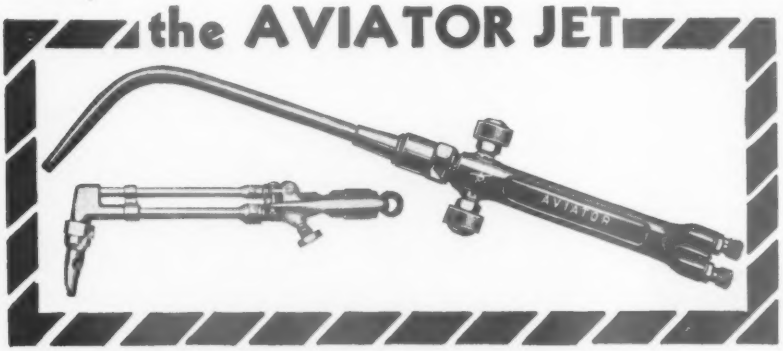

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Reynolds Aluminum Handled By U. S. Steel Supply

ALUMINUM mill and building products manufactured by Reynolds Metals Co. are now stocked in U. S. Steel Supply Co.'s 14 warehouses. For the present, structurals, bars and sheets will be only at Los Angeles, Chicago and San Francisco, but a full line of building products will be at all warehouses. Donald F. Stone is manager of the company's new aluminum sales division.

* * *

Speakers Announced For Pittsburgh IAA Meeting

SENATOR Karl E. Mundt of South Dakota, well known for his work on the House Un-American Activities Committee, was principal speaker at the opening luncheon of the International Acetylene Association's Convention at the Hotel William Penn in Pittsburgh on April 25. Speakers scheduled to deliver papers at the Monday afternoon and Tuesday Technical sessions were: George Mersot, general foreman, Inland Steel Co., East Chicago, Ind.; John T. Howat, president, Pittsburgh Metal Processing Co., Pittsburgh; F. H. Dill, welding engineer, American Bridge Co., Ambridge, Pa.; Alvah Small, vice-chairman, Underwriters Laboratories, Inc.; C. J. Herrly, sales manager, Niacet Chemicals Division, United States Vanadium Corp.; J. B. Smith, engineer, Factory Mutual Laboratories; L. P. Elly, welding supervisor, Bethlehem Steel Co., Bethlehem, Pa., and F. B. Rykoskey, supervisor of shops, Baltimore and Ohio Railroad Co.

* * *

Frank Blodgett Opens Welding Business in East

FRANK BLODGETT, formerly assistant sales manager for Stoody Co., has established a welding supply business at 66 Halstad Ave., Harrison, N. Y. Known as F. L. Blodgett & Co., the organization distributes Victor gas welding equipment and Stoody products over a territory which includes New England, eastern New York and the northeastern half of New Jersey.

* * *

Certificate of Merit Presented to A. O. Smith

A CERTIFICATE of Merit from President Truman was presented recently to William C. Heath, president of A. O. Smith Corp., Milwaukee, for work done by his company during the war in the production of welded hollow steel propellor blades. The presentation was made in Milwaukee by Maj. Gen. Paul L. Williams, commanding officer of 10th air force.

* * *

Compressed Gas Makers Change Association Title

NAME of the Compressed Gas Manufacturer's Association was changed to the Compressed Gas Association, Inc., at the 36th annual meeting as a result of the adoption by the members of a revised constitution and by-laws.

Officers elected to lead the association during 1949 were: Edmund Rowland, president; K. G. Jobson, first vice-president; Daniel Mapes, second vice-president and F. R. Fetherston, secretary-treasurer.

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Ohio State Sponsors Good Welding Conference

A stimulating two days of technical sessions were provided at the tenth annual Ohio Welding Conference, April 7-8 at Columbus, O., under sponsorship of the department of welding engineering, Ohio State University, and six Ohio sections of the American Welding Society. The eleven technical papers presented covered all branches of welding. Final attendants reached a total of 199 visitors, some of whom came from as far as Montreal and Toronto, Canada. The conference also helped to commemorate Ohio University's 75th anniversary.

C. B. Voldrich, chief welding engineer, Battelle Memorial Institute, Columbus, opened the technical part of the conference on Thursday morning by telling of two investigations carried out at Battelle on welded joints in aluminum plate up to 6 in. thick. Good welds were made by the inert-arc process, using both tungsten and consumable electrodes. Some of the welds were tested at the extremely low temperatures of –320 F (temperature of liquid nitrogen) and –420 F (liquid hydrogen). An interesting discovery was that at –320 F the tensile strength of 2S and 3S alloys more than doubles over tensile strength at room temperature and increases still more at –420 F. The weldability of high-strength, heat-treatable alloys 24S, 61S and 75S was also investigated by Mr. Voldrich's department at Battelle.

James I. Banash, consulting engineer, Chicago, spoke entertainingly of safe practices in oxyacetylene welding and cutting. Machine gas-cutting procedures were discussed with many interesting slides in a talk by R. M. Dennis, manager of fabrication, By Products Steel Co. (division of Lukens Steel Co.), Coatesville, Pa. One of his slides showed a piece 15 in. thick, through which holes had to be cut of lesser diameter than the metal thickness. It was done by first pushing through a small hole to preheat the steel.

At the Thursday afternoon session, A. F. Busick, Jr., chief engineer, Marion Power Shovel Co., Marion, O., delivered an extremely fine paper on the welded construction of 40 and 45 cu yd dippers for giant power shovels designed for the stripping of overburden from coal seams. High strength-weight ratios were obtained by using a modified quenched and tempered armor plate and also a high-alloy austenitic manganese hot-rolled steel. Relative weights of the empty dippers (using weight of the old 35 cu yd dipper as a base) were found to be: 35-100%; 40-87.5%; 45-72%. Weights of dippers with full load were: 35-100%; 40-92.7%; 45-94.3%. Welding and armor-plate steel thus combine to make available an increase in capacity of nearly 30% with a weight reduction of 5.7%. To fabricate the armor plate, Marion employed lime-type ferritic electrodes having alloy-steel cores. AISI 312 electrodes gave best results on the austenitic manganese steel. The latter material, it might be noted, could only be flame-cut by the powder-cutting process. Preheat and interpass temperatures of 300 F were used with both types of materials. (*Cont. on page 80.*)

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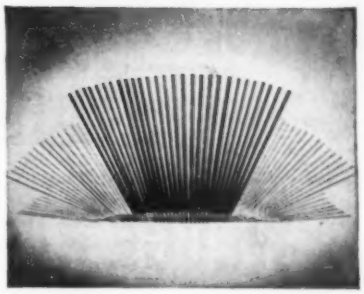
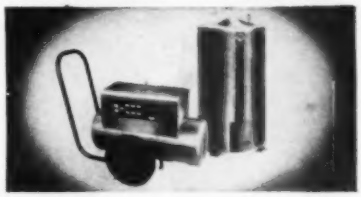


DESCRIPTIVE literature covering mild steel, low alloy and special steel, stainless steel, hard surfacing and build up and other special electrodes is available to those requesting full information on M & T's "SELECT 70"—seventy electrodes designed to cover all arc welding requirements—AC or DC, all-position or downhand work welding of mild steel, low alloys and stainless steels as well as hard surfacing and building up of worn parts.

Literature is brief but comprehensive, covering specifications, properties and applications for each electrode. Copies available on request received on company letterhead. Address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

NEW ARC WELDERS BOOST AC and DC PERFORMANCE



FASTER welding, better quality welds, lower power costs, and simplified maintenance are furnished by a new line of AC and DC arc welders introduced by Metal and Thermit Corporation.

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Speaking off the cuff, Martin P. Korn, consulting engineer of Detroit, delivered a witty talk on the advantages of the rigid-frame welded structure as compared to the conventional riveted design. Mr. Korn has studied the rigid frame for over 20 years. He gave this definition of it: "A rigid frame is a structural unit with one or more continuous joints with discontinuous axes." As he put it in another way, "The rigid frame has continuous knee action."

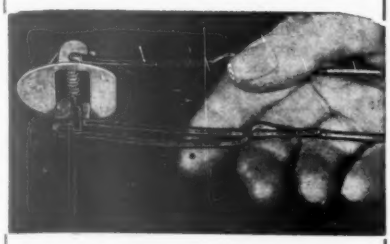
Some 120 conference delegates took advantage of the invitation extended them to attend the annual dinner meeting of the Columbus section of AWS. This was a very well-run affair with good food and not-too-long speeches. Feature address was made by O. B. J. Fraser, director of technical service on mill products, International Nickel Co., Inc., and first vice-president of the American Welding Society. Mr. Fraser predicted a brilliant future for all welding processes.

The Friday morning session was allotted to resistance welding. Papers were presented by James F. Deffenbaugh, chief electrical engineer, Federal Machine and Welder Co., Warren, O.; E. A. Mallett, sales engineer, The Taylor-Winfield Corp., Warren; and William H. Kearns, assistant welding engineer, Lustron Corp., Columbus. Mr. Deffenbaugh analyzed the power supply problems of resistance welders and described the main solutions which have been achieved such as energy storage by condenser, by transformer, by battery and by rotating flywheel as well as the newer methods of frequency converters (three-phase welding), metallic rectifiers and slope control. Mr. Mallett discussed the design of jigs and fixtures for resistance welding, while Mr. Kearns gave a factual and informative talk on the use of resistance welders in building Lustron's new steel-frame, porcelain-enameled, prefabricated five-room houses.

The concluding Thursday afternoon session was devoted entirely to codes for power piping and pressure vessels. F. E. LeGates, chief inspector, The Hartford Steam Boiler Inspection and Insurance Co., Cleveland, explained the role that has been played by the Hartford organization in the development of welding codes. J. H. Vance, member, board of boiler rules, Ohio state industrial commission, talked about the Ohio boiler code. L. K. Stringham, engineer in charge of welding applications, The Lincoln Electric Co., Cleveland, brought the conference to a successful close with his discussion of the design and application of our welding codes.

The four session chairmen, in proper chronological order, were: Dr. C. E. MacQuigg, dean of the college of engineering, Ohio State University; Fred L. Plummer, Hammond Iron Works, Warren, Pa., vice-president of AWS district No. 4; Dr. R. C. McMaster, supervisor, electrical engineering research, Battelle Memorial Institute, Columbus, and R. M. Shockey, referee, Ohio State industrial commission. R. R. Grant, chairman of the Columbus section, AWS, presided over the dinner meeting. Professor Robert S. Green, acting chairman of the university's department of welding engineering, served as chairman of the Welding Conference committee.

MOST ECONOMICAL



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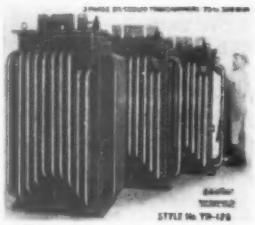

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Soldered Aluminum Radiators Cool Big Radio Tubes

A lightweight soldered and brazed aluminum radiator for large radio transmitting tubes has been developed by the Al-Fin Division of Fairchild Engine and Airplane Corp., New York City, in collaboration with engineers of the Westinghouse Lamp Division.

Utilizing aluminum in place of copper, the new radiator weighs only half as much as those in current use. Combined weight of a 25,000-watt transmitting tube and the newly-designed aluminum radiator is 98 lb. In comparison, the tube with the usual copper radiator weighs 225 lb.

To solder an aluminum radiator directly to the copper anode had previously proved impracticable because of the fast oxidizing rate of aluminum. The difficulty was overcome by surrounding the anode with a hollow steel core to which the anode is soldered directly. A thick layer, or muff, of aluminum is then cast and integrally bonded to the steel core by the "Al-Fin" process. A total of 140 aluminum radiator fins are brazed to this muff so that they fan out like a tissue-paper Christmas bell.

The aluminum-to-steel chemical bond offers no measurable resistance to the transfer of heat from the tube anode to the fins, M. V. Little, of Al-Fin Division, states. The aluminum muff is cooled in such a way as to preload the steel in compression so that the bond can withstand the varying rates of expansion in the severe thermal cycles experienced in the tube's normal use.

The Technical Slant

Gas Welding

OXYACETYLENE WELDING AND CUTTING by Stuart Plumley. Revised and rewritten by T. B. Jefferson. Published by McGraw-Hill Book Co., Inc., New York City 18, 1949. Cloth, 8¼x11 in.; 356 pages. Price $6.50.

Specialized techniques in modern oxyacetylene welding and cutting such as pipe welding, joining of light metals, preheating of aluminum castings, etc., as well as basic fundamentals are explained in this textbook for both classroom and home-study purposes. Pipe welding information covers edge preparation, how-to-draw templates for shapes such as 90-deg Y-branches and expansion and contraction of large diameter piping. Before getting down to specific instructions, the book familiarizes the student with the equipment used in the processes, explaining design, construction and operation of torches, gauges and regulators.

Lesson sheets are included at the end of pertinent chapters to facilitate review. Each exercise describes specific work which the student is expected to do for practice. Early exercises are confined to applications on mild steels, while later ones deal with fusion and brazing of other metals.

Five closing chapters of the book are designed particularly for those who intend to go into business for themselves, though all students will find the information useful. Data on figuring overhead, simple cost systems, time charging and cost estimating plans are presented in readable terms.

NOW!
A 170 Amp. AC Welder for $123.50!

110/220 VOLTS

1. Over 25,000 in use—U. L. approved.
2. Handles from 1/16" to 5/32" rod.
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About People

J. H. HUMBERSTONE was recently honored in Baltimore at a "Joe Humberstone Night" staged by the Maryland Section of the American Welding Society. Mr. Humberstone's many services to the AWS in local and national capacities were recognized with the award of an AWS pin, welded stainless steel bookends and a citation.

* * *

FRED A. KAUFMAN has been appointed sales manager of the Electrode Division of The McKay Co. He was formerly chief metallurgical engineer in charge of technical service, research and quality control at McKay's electrode plant in York, Pa. He is a member of the American Welding Society, the American Society for Metals, the American Institute of Mining and Metallurgical Engineers and American Ceramic Society.

* * *

EDWIN J. SCHWANHAUSSER, vice-president in charge of sales, Worthington Pump and Machinery Corp., has been elected to board of trustees of Stevens Institute of Technology.

* * *

ROBERT B. COPPAGE will handle stud welding applications for the Big Three Welding & Equipment Co. in the Fort Worth-Dallas territory. JACK W. HARRIS has been named stud welding specialist for the Oklahoma Oxygen Co., Tulsa, Okla., a distributor for Big Three Welding. Big Three Welding is the sole distributor in the southwest for the Nelson Stud Welding Division of Morton Gregory Corp., Lorain, O.

* * *

H. W. MACINTOSH, has been appointed treasurer of L. O. Koven & Brother, Inc., Jersey City, N. J., manufacturer of welded boilers and tanks and other weldments.

* * *

ROBERT L. BURKE has been named general manager of Wyzenbeek & Staff, Inc., Chicago flexible shaft tool makers. WALTER MISHLER continues as sales manager.

* * *

EDMUND PFEIFER became assistant district manager of sales for the Boston office of Lukens Steel Co. on April 1. CHARLES H. PYLE will take over the territory in the Coatesville, Pa., district formerly handled by Mr. Pfeifer.

* * *

WILLIAM O. "BILL" SCHNEIDERWIND was elected president of the Omaha Welding Co., Omaha, Nebr., at a meeting of the board of directors on March 29. He succeeds his father, the late L. O. "HEINIE" SCHNEIDERWIND. Mr. Schneiderwind is a graduate of the University of Nebraska in business administration and has been with Omaha Welding Co. since 1937. He is also president of Will-Weld Mfg. Co. W. J. "WOODY" DILLMAN was elected vice-president. Other officers are MRS. MERCY A. SCHNEIDERWIND, secretary, and DON CARROLL, treasurer, both of whom continue in their positions.

* * *

BARRON D. BERGER has been appointed chief engineer of National Electric Welding Machines Co., Bay City, Mich. Mr. Berger was formerly assistant chief engineer in charge of special machine design at Federal Machine and Welder Co., Warren, O. He has served as chairman and committee member on various RWMA technical committees.

* * *

L. M. GUMM has been appointed metal working consultant for the Industrial Sales Dept. of Westinghouse Electric Corp., Pittsburgh. K. M. PATTERSON was named manager of the steel mill and metal working section.

* * *

S. W. CORBIN has been appointed assistant manager of the Industrial Divisions of General Electric's Apparatus Department.

* * *

RUSSELL J. SKINNER has been named assistant district manager of United States Steel Supply Co. at St. Louis, Mo.

* * *

E. CORBIN CHAPMAN has been appointed chief metallurgist of Combustion Engineering-Superheater, Inc., New York City. A past southern vice-president of the American Welding Society, he is a member of ASME and AWS committees for welding, high alloy steels, clad steels army ordnance and pressure vessels. During World War II he was supervisor of development of electrodes for welding armor plate for National Defense Research Council.

* * *

L. C. NEWTON has been appointed sales representative for North Dakota and Minnesota by Titan Mfg. Co., Bellefonte, Pa. His offices are at 630 North Prior Ave., St. Paul, Minn.

* * *

Died

O. L. (HEINIE) SCHNEIDERWIND, president of the Omaha Welding Co., Omaha, Nebr., died on March 23. "Heinie" Schneiderwind was one of the best known and best loved individuals in the welding industry in the midwest. In 1918 he started the Omaha Welding Co. which has grown to be one of the largest welding supply and heavy hardware houses serving Iowa and Nebraska. Mr. Schneiderwind was the first president of the National Welding Supply Association, past president of the Nebraska Small Business Men's Association and was active in American Welding Society and Masonic affairs in Nebraska.

* * *

FRANK H. STOHR, 47, general manager of the Allis-Chalmers Mfg. Co.'s Norwood, O., works, died on March 29. Mr. Stohr worked for Westinghouse Electric Corp. for 22 years prior to 1944, in which year he was manager of the industries sales division.

* * *

ELMORE H. SCHIEMANN, engineer associated with Pioneer Service & Engineering Co., Chicago, for many years, died on Feb. 11. He was a registered professional engineer in Illinois, Oklahoma, Minnesota, Colorado and California, a member of the American Welding Society and American Society for Testing Materials.

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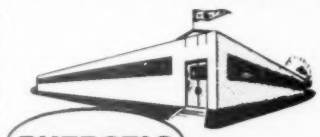

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30 YEARS AGO

(From THE WELDING ENGINEER of May, 1919)

CAPTAIN George N. Sieger of the Army Motor Transportation Corps writes about the extensive use of welding and cutting equipment at a 1,000-acre motor repair depot in France. Captain Sieger is officer-in-charge of the oxygen-hydrogen plant at the depot. The article includes a breakdown into types of the more than 2,000 major repairs finished at the base every month and the numerous facilities for doing the work. The production of acetylene for bridge lights, road lights, etc., for the Army of Occupation at Coblenz, Germany, plus other uses for compressed gases imposes a strain on production machinery at the depot, Capt. Sieger reports.

30 YEARS AGO

JURISDICTIONAL disputes over the use of the welding torch in railroad maintenance shops are reflected in a letter to the editor from J. S. Histed, Richmond, Va. An agreement has been reached in which coppersmiths, blacksmiths and machinists learning to weld can repair any type of metal to get a variety of experience. After the beginner has returned to his own department he must confine his welding to his own craft.

30 YEARS AGO

TEACHING disabled soldiers and handicapped men the art of welding is one of the helpful activities of the Red Cross Institute of New York City. Graduates of the Red Cross welding shop at 311 Fourth Ave., have obtained jobs with streetcar companies, shipyards and garages.

30 YEARS AGO

FIRST issue of the *Canadian Welding Journal*, published by The Wilcox-Robinson Co., Toronto, has been distributed.

30 YEARS AGO

ALFRED S. KINSEY and Alexander F. Jenkins are featured in "Who's Who in Welding" this month. Mr. Jenkins has operated oxygen and acetylene factories in England and in this country has established the Alexander Milburn Co. in Baltimore and the Alexander F. Jenkins Corp. Mr. Kinsey is professor of engineering shop practice at Stevens Institute of Technology, a director of the American Welding Society and vice-director of the American Bureau of Welding.

30 YEARS AGO

THE INTERNATIONAL ACETYLENE ASSOCIATION is asking members about holding a convention in New York City in July, 1919. For several years the conventions have been cancelled but now that business conditions are returning to normal, association president John T. Earl suggests an early meeting.

30 YEARS AGO

ADDITION of welding instruction to the curriculum in all high schools and trade schools is advocated by B. K. Smith in a letter to the editor. He suggests teaching the students the history of the art as well as shop practices.

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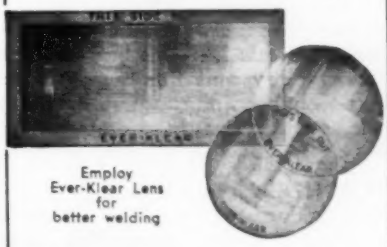

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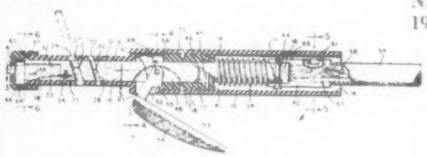
From the Patent Office

Electrode Holder

2,458,723. Gustaf F. Nilsson, Minneapolis, Minn. Filed April 5, 1947. Issued Jan. 11, 1949.

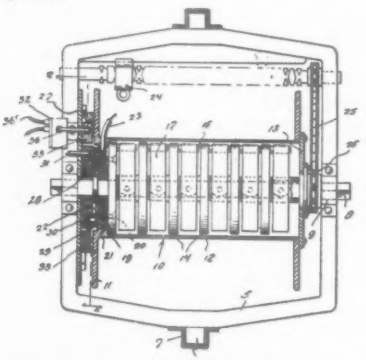


A plunger inside an elongated case on this electrode holder has a vee-shaped groove for holding the electrode. A jaw on the spring attached to the plunger moves the electrode toward the vertex of the groove. A handle moves the jaw inwardly against the apex of the groove upon movement of plunger within the case.

* * *

Welding Line Reel Switch

2,453,407. Jake D. Burns, Richmond, Calif. Filed Sept. 11, 1944. Issued Nov. 9, 1948.

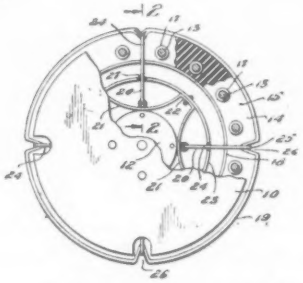


A self-winding reel for electric cables comprises a drum with flanges at the ends providing a cable-winding reel, a stationary shaft and means rotatably mounting the reel on the shaft. The shaft is mounted in the sides of the frame with the reel positioned in an opening in the frame. A number of spring elements positioned in the drum of the reel forms a spring motor with one end of the spring elements attached to the shaft and the opposite ends attached to the reel. A stationary disc on the frame is positioned between the reel and a side of the frame. A hub with hook-shaped projections in recesses in the periphery extends from the periphery of the disc. A dog carrying a pawl and having a pin projecting from it is pivotally mounted on a flange at the end of the reel adjacent the stationary disc of the frame. It is positioned to ride along the periphery of the hub and engage alternately the hook-shaped projections. An arcuate guide strip is attached to the surface of the disc to be engaged by the pawl pin to hold the pawl out of engagement with at least one of the projections of the hub upon retraction of the cable-winding reel. A resiliently held plunger is slidably mounted in the hub under one of the projections to be engaged by the pawl. A switch is positioned to be actuated by the plunger, and contact rings are positioned on the ends of the reel and disc through which a circuit to a cable on the reel may be completed.

* * *

Abrasive Wheel With Resilient Rim

2,451,753. Miles E. Landau, Brooklyn, N. Y. Filed Oct. 15, 1947. Issued Oct. 19, 1948.

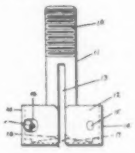


In a new abrasive wheel, a hub having side plates disposed in spaced relation provides a circumferentially extending space between them. A flexible resilient tread is mounted between the side plates with the outer peripheral portion protruding beyond the peripheries of the plates. The side plates have spaced trunnions extending through apertures in the tread for loosely supporting the tread between the plates and permitting it to move radially. An annular spring band is freely arranged between the side plates in surrounding relation with the hub.

* * *

Split Chuck for Welding Guns

2,456,664. William P. Yurgensen, Sharon Hill, Pa. Filed Nov. 29, 1945. Issued Dec. 21, 1948.



A chuck has a body slotted longitudinally at one end to provide several portions. Each portion is flexible with respect to each other with several ears detachably secured to the periphery of the portions at the slotted end of the body.

* * *

Resistance Welder

2,460,759. George B. Martin, Detroit, Mich., and Barron D. Berger, Warren, O. Assigned to The Federal Machine and Welder Co., Warren, O. Filed Aug. 20, 1946. Issued Feb. 1, 1949.

This patent pertains to a resistance welder which has leaf springs attached to the parts which actuate the electrodes toward the work. The leaf springs deflect an amount proportionate to the thrust applied, thus providing means for controlling the welding operation.

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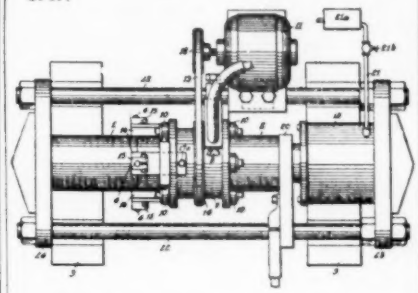
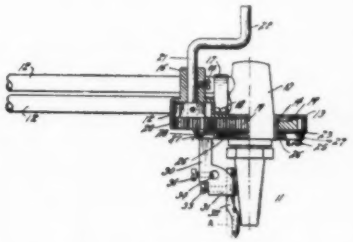
Pipe-Welding Method

2,459,047. PAUL B. SCHARF, Bradford, Pa. Assigned to Dresser Industries, Inc. Filed March 25, 1944. Issued Jan. 11, 1949.



Utilizing an electric arc, two pipe sections are heated and rapidly rotated so that an arc moves along the circumference of each pipe by jumps. When the opposing edges are uniformly heated around their entire circumference, the two pipes are pressed together to make a weld.

* * *



Cutting Torch Holder

2,452,718. JAMES HENRY BLYTHE, Denver, Colo. Filed July 24, 1944. Issued Nov. 2, 1948.

A guiding attachment for a cutting tool comprises a ring gear mounted to rotate about the axis of the tool. A radius arm is pivotally clamped at its one end to the ring gear at one side of the axis of the tool and extends to the opposite side. A center point member extends from the free end of the arm to a radial position with reference to the axis.

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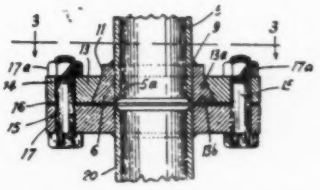
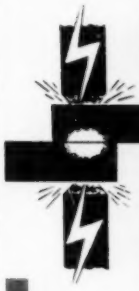


Two-Piece Pipe Flange

2,460,311. NEIL J. RILEY, Lyndhurst, N. J. Filed Aug. 11, 1945. Issued Feb. 1, 1949.

New pipe coupling consists of a flange ring and a conical collar welded on two pipe ends with a flange-forming ring fitting over the conical collar. Registrable bolt holes run through one flange and the flange forming ring. A gasket fits between the flange and flange forming ring so that a watertight fit is obtained when bolts are inserted and tightened.



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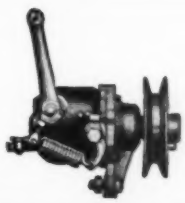

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